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The Jackson Lecture.

THOMAS SYDENHAM: THE FATHER OF ENGLISH MEDICINE.¹

By KONRAD HIRSCHFELD,
Brisbane.

Sydenham a great, a mighty genius came,
Who founded Medicine on the noblest frame;
He study'd Nature thro'; and Nature's laws
Nor blindly puzzled for the peccant cause.
Father of Physic he—immortal name!
Who leaves the Grecian but a second fame.
Sing forth, ye Muses, in sublimer strains
A new Hippocrates in Britain reigns:
With ev'ry healing plant his grave adorn,
Saviour of many millions yet unborn.

SEWEL.

It is the fashion today to sympathize with youth, because the problems which confront it are so much more formidable than those of yesteryear. It is, I believe, like so many fashions, a very bad one. I can understand the youth of today being somewhat appalled at what he sees in the future, but only because he no longer studies

history. As Churchill has said, "the longer you can look backward, the further you can look forward".

Modern youth stands on his father's shoulders, armed with the knowledge and experience of his father. It is a good thing that every now and then we should pause to examine that knowledge and experience, and the manner in which it was acquired. This we can do by looking back into history. Such glances into the past on the one hand impress us with the gullibility of man and the facility with which he adopts a false doctrine, but on the other give us a proper pride in our profession and its practitioners. We gain confidence and courage to face a future that is no more terrifying to us, with our present knowledge, than it was to prehistoric man with his. Can the fearful emotions of prehistoric man, on his first view of some of the monsters which then walked the earth, have been any less than ours when faced with the atomic bomb? Should we show less courage than he did and allow the human race to perish from fear?

The Jackson Lecture, on the history of medicine, was established in 1931 by the Queensland Branch of the British Medical Association in honour of Ernest Sandford Jackson, a medical practitioner of this city. The choice of medical history for the lecture was a compliment to his interest in history and the lecture was initiated in time for him to give the first of the series. It gives us an opportunity tonight to look back and to see what we can learn for the future.

¹ Delivered at Brisbane on September 3, 1954; received for publication on August 8, 1955.

Cicero observed nearly two thousand years ago that: "Learned men not only teach and instruct others desirous to learn during their life, and while they are still with us, but even after death they do the same by the records of literature they leave behind them."

Dr. Jackson was one of these learned men, and tonight I propose to speak of another of them, Thomas Sydenham, who lived in the years 1624 to 1689. One of the things for which Sydenham is remembered is his treatment of smallpox, known as the cool treatment. Jackson is remembered as one of the advocates of the cool treatment of typhoid fever. The application of this treatment brought much fame to the Brisbane Hospital, of which Jackson was then superintendent. In each case the treatment was cool in the sense that it was neither hot nor cold, but was in fact a treatment in which moderation was used rather than extremes.

Thomas Sydenham was born in the year 1624, at Wynford Eagle in Dorset, one of the ten children of Thomas Sydenham the elder. He was of good family, but together with his elder brother William, was the first member of the Sydenham family to be known beyond the pale of its provincial respectability. Little is known of his early education, but in 1642, at Oxford, when he was in his eighteenth year, he matriculated as a fellow commoner at Magdalen Hall, a foundation now incorporated in Hertford College. His stay in Oxford was of short duration because of the outbreak of the first Civil War. The county of Dorset was a hotbed of Puritan sentiments. Clarendon, indeed, spoke of Dorchester as the most malignant (Puritan) place in England, and as the members of the Sydenham family were ardent supporters of the Puritan side, Oxford, full of ardent Royalists and the site of Royalist headquarters, was no place for such as Thomas Sydenham.

His eldest brother William, in the year 1643, received a commission as a captain in the Parliamentary forces, and by December of the same year was already a colonel. He is that Colonel William Sydenham of whom Pepys wrote on January 17, 1659: "Thence I went to Westminster and met Shaw and Washington who told me how this day Sydenham was voted out of the House for sitting any more this Parliament." William Sydenham had been governor of Melcombe, member of Parliament for the county of Dorset and one of the Committee for Public Safety.

There is now no doubt that Thomas Sydenham embraced the Puritan cause with conviction and that when engaged in the quarrel he acquitted himself like a man. Neither is there any doubt that his Puritan sympathies and the activities of his brothers and himself in the army did much to influence his future career.

The brothers took part in the defence of Poole in the year 1643 and in the fighting for Weymouth and Melcombe Regis, of which towns Colonel Sydenham was in command. Later their mother, Mrs. Sydenham, was killed in the war. Thomas Sydenham's part in the war is not very clear, but he was slightly wounded in a sally from the besieged Melcombe Regis in 1645. There is no definite proof, however, that he held any military rank in the first Civil War.

About 1646, probably at the end of the year, Thomas returned to Oxford. On his way to London en-route to Oxford he gives this account of the journey: "I had the good fortune to fall in with the most learned and honourable Dr. Thomas Cox, who was at that time attending my brother during an illness, and then, as he has been up to the present time, practising medicine with great distinction; he, with his well known kindness and courtesy, asked me what profession I was preparing to enter, now that I was resuming my interrupted studies and was come to man's estate. I had at that time no fixed plans and was not even dreaming of the profession of medicine; but moved by the recommendation and influence of so great a man, and in some way, I suppose, by my own destiny, I applied myself seriously to that pursuit."

Oxford in the year 1647 was very different from the tranquil university town of tradition. It had been a garrison town for some four years, during which its

walls had been manned by Charles's soldiers, though fortunately there had been no assault. The king had had his headquarters there, and his was one of the many lost causes which have from time to time found a spiritual home in Oxford.

The Royalist stronghold had impoverished itself for the king, who had drawn heavily upon its accumulated treasure (and for this reason little early silverware is to be seen there today). The military comings and goings had quite disorganized the affairs of the University; and after the end of the Civil War, Oxford was flooded with ex-servicemen seeking to complete an education thoroughly disrupted by the disturbances of the past years.

In May, 1647, Parliament appointed visitors, naturally of Puritan persuasion. The duty of these visitors was to purge the university of all who refused to take the covenant or who opposed the ruling powers. The university made a vigorous and organized opposition thoroughly in keeping with its conduct during the war. The conflicts which ensued did not make for that peace so essential in the home of learning and so in the year 1648 the Earl of Pembroke was sent up as Chancellor. He, who had himself been dispossessed by Charles I, found little difficulty, in turn, in dispossessing some 400 Royalist members of the university who refused to submit.

Thomas Sydenham appears on the records as a supporter of the Parliamentary Visitors. In September, 1647, he was on the College books as a fellow commoner of Wadham.

To satisfy the numerous ex-servicemen whose residential qualifications and academic exercises were not sufficient for a degree and to fill up the many vacancies caused by the purge, the Puritans exercised a right, always possessed by the university, of conferring degrees by actual creation. This occasion was known as the Pembroke Creation and followed a precedent set by Charles I after the battle of Edgehill. Among the recipients of Pembroke's bounty was Thomas Sydenham, who was created a Bachelor of Medicine. It is uncertain whether he was also created Master of Arts as required by the statutes, or if he had already obtained this standing. Just computation of the time shows that he could have made little serious study of medicine and so he was fortunate enough to obtain a degree at the beginning rather than at the end of his student's course. But his interest did not end here, for he was made a Fellow of All Souls' College, and later bursar of the College; thus he must have been in comfortable circumstances. He certainly had the qualifications required of Fellows by the statutes of All Souls, "*Bene nati, bene vestiti et mediocriter docti*"—well-born, well-clothed and moderately learned—and, we might add, well-favoured.

The new regime, anxious to silence possible critics (who regarded some of the new members from Cambridge as "the dregs of the neighbour university"), took care to select from their supporters men likely to do them credit. They succeeded so well that even Clarendon grudgingly admitted that the reforms of the Puritans yielded a harvest of extraordinary good and sound knowledge in all parts of learning.

The ensuing period was a notable one even for Oxford, for Willis the anatomist, Goddard (the Protector's physician, afterwards Professor of Medicine in Gresham College), Petty the anatomist and economist, and the great Robert Boyle were in residence. A group of Wadham men, which includes Dr. Wilkins, the Warden, Christopher Wren and Sydenham, has left its mark indelibly in Oxford and in learning.

Such times as these, which had seen the divine right of the king questioned and repudiated, his edicts resisted by force of arms and even his life ended by his subjects, did not encourage respect for lesser authorities. Men had been forced to choose sides in matters affecting their lives and properties and had given much thought to their course of action. They brought these same habits to the university. In the past their lives had depended on their own decisions, based upon the observation of events around them, and they had little respect for authority. They approached the problems they studied in the same way. There was little

love of old doctrines on the score of their antiquity or sanctity and there was less tendency to acquiesce in authority than to observe and criticize.

In such circumstances it is not surprising that Sydenham learned to question and to observe and to dissent easily from authorities. It was fortunate that his public, when his own observations were published, was already prepared to accept his departure from tradition through its own part in a civil war, with all its upheaval of mental habits.

About this time in London began weekly meetings of "divers worthy persons inquisitive into natural philosophy and other parts of human learning and particularly of what hath been called the new and experimental philosophy". This gathering of philosophers was the invisible

Brent, who in 1646 had himself succeeded William Harvey as Warden. Goddard was at once ejected by Charles II, a fate which also befell Dr. Wilkins, who had become Master of Trinity College, Cambridge, in 1659.

Thus, by the year 1661, all the members of the Philosophical Society were once more in London. There they were augmented by many others, among whom was Robert Hooke, described by Pepys in 1665 as the most eminent of all the scientific men he met at the Royal Society.

The invisible college had continued to meet during the time of the Commonwealth, and now, with the Oxford members who had returned to London and some Royalists of scientific bent, decided, after a lecture at Gresham College in 1660, to organize themselves formally if they could secure Royal approval. This was obtained, and their first meeting was in November, 1660, when they agreed to form a College for the promotion of Physical, Mathematical and Experimental Learning under the chairmanship of Dr. Wilkins. The Society, which was referred to by Evelyn in 1661 as The Royal Society, received in 1662 a charter from Charles II and adopted as its motto "*Nullius in Verba*"; "Not under bond to abide by any master's authority."

The Society used to meet in Gresham College, which had been founded in the year 1574 by Sir Thomas Gresham. He had in 1570 founded the Royal Exchange and had been given the right to let shops in the building. The rents from the property were to be used to endow the college which was to be established in his town house. There were to be seven courses of lectures, to be given in Latin in the mornings and English in the afternoons throughout the term. The subjects were divinity, astronomy, geometry, music, law, medicine and rhetoric. The lecturers, who received a stipend of £50 per annum and a suite of apartments, were to be unmarried. The lectures today are given only in English. Like the fellowships of All Souls, the lectures provided a living for the holders during the time that they were making their way in their own particular profession.

Science in England owes much to Gresham College and to its professors. Almost all the men who contributed to scientific achievement in the seventeenth century were professors in the College. The financial support it provided, though not luxurious, was enough to enable them to go where their genius led, just as the All Souls Fellowships have enabled so many men to exist until their work made their future secure.

Sir Thomas Gresham himself had been the foremost economist of his day, adviser of kings and queens, and founder of the Royal Exchange, which still uses his crest, a grasshopper. It may be of interest here to mention that the Oxford Companion to English Literature finds little more to say of him than that "the foolish story that he was a foundling and adopted his well-known crest because his life was saved by the chirping of a grass-hopper, is disproved by the fact that the crest was used by his ancestor, James Gresham, in the 15th century".

To return to Sydenham. His friendship with Dr. Wilkins, which caused him to change to Wadham after the war, brought him into contact with the members of the Oxford branch of the Philosophical Society. He was greatly influenced no doubt in his independence of mind by his association with Robert Boyle, to whom he afterwards dedicated his first book, and with Christopher Wren, a contemporary Fellow of All Souls.

The opportunities for medical study at Oxford were at that time very limited. The Regius Professor was required still to lecture on the teachings of Hippocrates and Galen, and the latter's commentaries on Hippocrates were regarded with more favour than the very works of the master. Anatomy was taught to the extent of three "anatomies" a year. Sir Thomas Clayton, Regius Professor of Medicine in Sydenham's time, is said to have been unable to withstand the sight of blood, and to have offered Dr. William Petty, Tomlyn's Reader in Anatomy, as a substitute. Petty is celebrated for his revival of a poor woman, Anne Greene, who was executed at Oxford on December 14, 1650, but when brought to the Anatomy School was found to be



FIGURE I.

Photograph of Mary Beale's portrait in the Royal College of Physicians. Sydenham in his middle forties. Reproduced by permission.¹

college of which Boyle wrote in the years 1646 to 1647. Almost to a man they were Parliamentarians and with the end of the war many of them were given appointments in Oxford. There, in 1651, they formed a similar association with the title of the Philosophical Society of Oxford. They met in the rooms of Dr. Wilkins, Warden of Wadham. This Wilkins, who married the sister of Oliver Cromwell in the year 1654, was afterwards the "fantastic Bishop of Chester", and wrote, among other books, "A Discourse Concerning the Possibility of a Passage to the Moon".

A close liaison was maintained between the Oxford and London philosophers until the Restoration. With the return of the Royalists to Oxford, many of the Parliamentarians were summarily ejected from their posts, and others did not wait to be relieved but left for London. Goddard, who had been appointed Warden of Merton College in 1651, was one of the members of the invisible college and thus took part in the meetings of the Philosophical Society at Oxford. He had succeeded Sir Nathaniel

¹ Figures I, II and III are from "The Portraits of Thomas Sydenham" by Harold Jones, *Ann. M. Hist.*, 1940, Third Series, 2: 265.

not yet dead. The endowment of the Tomlyn's readership, held by Petty, provided £3 with which to hire a surgeon to dissect the body, and forty shillings with which to pay for its proper burial.

Education in medicine was better in London thanks to the Lumley Lectureship in Surgery, held by the illustrious Harvey, and the Goulstonian Lectureship in Pathology. In each case the lecturers were to be practical men who lectured on things they had seen for themselves, and not on Galen, as was the practice in the universities.

Not unnaturally, most students from Oxford studied abroad, and Sydenham was no exception; he received his best practical instruction at Montpellier, but before his study abroad the second Civil War caused another interruption to his medical career. In 1650 Cromwell was sent to Scotland to fight the army of Charles II, who had landed in the month of June. In the absence of Cromwell the militia were mobilized to guard Parliament. Sydenham secured a commission as a captain in the cavalry, and he apparently served for some six months.

It was at this time that Thomas Sydenham had a remarkable adventure, which is related by Dr. Andrew Brown, who had it from Sydenham himself in 1687:

At the time of those civil wars, when he discharged the office of captain, he, being in his lodging at London and going to bed at night with his clothes loosed, a mad drunk fellow, a soldier likewise in the same lodgery entering the room, with one hand gripping him by the breast of his shirt, with the other discharged a loaded pistol in his bosom. Yet, oh strange, without any hurt to him. Most wonderfully indeed by such a narrow shield as the edge of the soldier's hand was his breast defended. For the admirable providence of God placed and fixed the tottering hand that gripped the shirt into that place and posture, that the edge thereof and all the bones of the metacarpus that make up the breadth of the hand, were situate in a right line betwixt the mouth of the pistol and his breast; and so the bullet discharged, neither declined to the one side nor to the other, but keeping its way through all these bones, in crushing them lost its force, and fell at his feet. Oh! wonderful situation of the hand, and more wonderful course of the bullet! by any industry or art never again imitable, and, moreover, within a few days the soldier being taken with a fever arising from so dangerous and complicate a wound, died. Surely Providence does not bring forth so stupendous miracles, but for some great and equivalent end.

We are reminded of Clive of India, and his miracle. In addition to this incident in London, Sydenham also told Brown that he was once left on the field for dead. However, there is little evidence as to how long he served, but in 1653 he petitioned the Lord Protector for a satisfactory settlement in consideration of the services of himself and his family. The petition exists in his own handwriting and is definite evidence of his services. The petition was granted, and he received a grant of £600 and a promise of an appointment. The appointment, however, was not forthcoming for some five years.

In 1656 he resigned his fellowship at All Souls and in the same year he married Mary Gee at Wynford Eagle. There is little information available about his wife or his marriage. His wife was alive when he died and they had had at least three children. It seems probable that he began practice as a physician in Westminster, where he took a house in King Street, near the Protector's Court and the official residences of the statesmen and generals. With these Sydenham must have had some contact by reason of his family's service to the cause. The neighbourhood was swampy and malarious and so the fevers of which he made such a study must have abounded, as did gnats and mosquitoes. Cromwell himself died of a recurrence of an old-established malignant ague.

Sydenham does not seem to have been thoroughly settled in his profession as yet, for he stood for Parliament in 1658 as the candidate for Weymouth. He was not elected. However, soon afterwards he received the appointment promised years before and he became "Comptroller of the Pipe". The Pipe Office was a department of the Court of Exchequer and was concerned with Crown lands and other financial matters. The office was abolished by William IV.

The Restoration, fortunately for medicine, probably ended Sydenham's tenure of this office.

It seems probable that it was at this time that Sydenham went off to the Continent to study at Montpellier. There is no direct evidence of this at all, nor of the length of the period that he was there. It is likely, however, that it was in 1659, for it was in the previous year that Charles Barbeyrac established his reputation by his learned though unsuccessful disputations for the Chair of Medicine. Barbeyrac seems to have been very like Sydenham in his methods, and Locke, Sydenham's friend and pupil, stated that he never knew two men more alike in opinions and character. It is a reasonable supposition that he was Sydenham's teacher in medicine. Montpellier at the time was regarded as the chief centre for the Hippocratic approach as distinct from the Galenism of Paris, Oxford, Cambridge and the so-called Chemical School of Paracelsus in Europe. Montpellier had long been a famous medical school, and since the year 1272 no one could practise medicine there until he had been approved as satisfactory by the Faculty. Nostrodamus, the astrologer, became a doctor of medicine at Montpellier in 1629. The school was also noted for its tolerance of peoples and religions, and perhaps the cosmopolitan atmosphere at Montpellier had much to do with the original outlook of Sydenham.

Thus there is very little information about Sydenham's activities during these years. It is certain he was in the army, that he petitioned Cromwell, that he resigned from All Souls, that he married, that he stood for Parliament unsuccessfully and that he was appointed to be Comptroller of the Pipe.

His history of fevers began in the year 1661, so he must have been well established by then and have already gained confidence in his own methods. In 1663 he obtained a licence to practise from the Royal College of Physicians. He passed the three examinations on April 24, May 8 and June 5. He was admitted as a Licentiate on June 25, 1663. He was registered as Master of Arts and Bachelor of Medicine at Oxford, though there seems some doubt as to his M.A. degree. Apparently the University of Oxford was no less casual then than it is now in giving evidence of a degree to a graduate.

The Charter of the Royal College of Physicians gave it control of all who wished to practise medicine within a seven-mile radius around London. It issued the Licentiate by examination, but the Fellowship was filled by selection. Only doctors of medicine of Oxford and Cambridge were eligible by decree of Charles II. Sydenham had not taken his doctorate at Oxford by the time of the Restoration, and with the return of the Royalists to office it was unlikely that he could have succeeded in obtaining the degree. At all events Locke had some difficulties and humiliations in his attempt and finally gave up, despite influential support.

As Sydenham was not a doctor of medicine he was not therefore eligible to be a Fellow of the College of Physicians until 1676, when he did become a doctor of medicine at Cambridge where his son was then in residence. Why he did not then become a Fellow of the Royal College of Physicians is not clear, for although Sydenham himself constantly refers to the jealousy and envy of those that surrounded him, nevertheless his standing with the most influential Fellows of the day seems to have been excellent.

On the other hand, it may be that as the majority of Fellows were doctors of medicine of Oxford and Cambridge, and therefore adherents of the Galen school, they looked askance at one who had no respect whatever for Galen, who indeed, if it had occurred to him, might have burned Galen's works publicly as had Paracelsus. Certain it is that his friends in the College were also rebels against accepted practice.

Sydenham's political views, in preventing him from obtaining his doctorate of medicine at Oxford, therefore indirectly kept him out of the Fellowship of the College, at all events until 1676. Thereafter he did not apply for the Fellowship, perhaps because he thought he would not be elected. He had told Andrew Brown that he had only gained the sad and unjust recompense of calumny and

ignominy, and that from the emulation of some of his collegiate brethren, and others, whose indignation at length did culminate to that height, that they endeavoured to banish him, as guilty of medicinal heresies, out of that illustrious Society. His belief that he was not given his due by the envious reminds one that Benvenuto Cellini held similar ideas concerning his colleagues. Perhaps such a belief is the prerogative of genius.

From this time on, Sydenham is no longer the historically ghost-like character he has been. For in 1661 began the observations which were published in his first book, and

Sydenham is honoured there no less than his contemporaries, who with no less hazard crossed the seas so long before.

After 1661 we can get some idea of the man from his works. Even in these we still have some separation from Sydenham himself, for they were all published in Latin. There has been much controversy as to whether he wrote them in Latin or in English. There seems little doubt that he could have written them in Latin had he wished, but that, in fact, they were translated into Latin by Dr. Maplettoft, with the exception of the "*Schedula Monitoria*", which was translated by Dr. Havers of Cambridge. There is little of Sydenham's own handwriting preserved. There are only five of his letters and there is a concillium or consultation by Sydenham in the papers of Lord Shaftesbury.

Sydenham's works have since been translated four times. The first translation by Pechey in 1697 was already in the ninth edition by 1727. This was the same Pechey who was fined by the censors of the Royal College of Physicians for misconduct in advertising. The second translation was by Swann. The third was by Wallis, and the last by Dr. Latham, whose beautiful English gives such pleasure to the reader. Swann's edition includes the life story of Thomas Sydenham written by Samuel Johnson. The latter had left Oxford in a somewhat impoverished state and then eked out an existence for some years by writing the lives of various famous men for *The Gentlemen's Magazine*. Johnson's life of Sydenham was published in 1742.

From an anecdote told by Charles James Fox we learn that Sydenham smoked and drank the small beer he so often recommended to his patients. According to this story, Sydenham, who was then living in Pall Mall near the present College of Physicians, was sitting at his open window looking on to The Mall (the south side of the street being not then built), with his pipe in his mouth and a silver tankard before him, when a fellow made a snatch at the tankard and ran off with it. Nor was he overtaken before he got among the bushes in Bond Street, and there they left him.

Sydenham's first book was a study of the epidemic fevers which raged in London. This work on the fevers was called "Medical Observations Concerning the History and Cure of Acute Disease, or The Methodus Medendi", and was published in 1666. It was reviewed in the Royal Society transactions in the same year.

He intended later to publish a similar book on chronic disease, but his health became so bad because of his gout that he was unable to carry out his plan; however, he did write in some measure on chronic disease in response to requests from his friends. These writings were "The Epistles". The first, published in 1678, was on epidemic fevers up to that year. The second, published in 1681, was on venereal disease. Another work was the "Epistolary Dissertation", also in 1681, on smallpox, and on the hysterical affections. In 1683 he produced a treatise on gout and dropsy. His final work, in 1686, was the "*Schedula Monitoria*, or Warning of a New Fever", and contained two other chapters. It was in this book that he described the chorea since known by his name. Prior to Sydenham's death in 1689 most of these works had run through several editions both in England and abroad, so that Sydenham was already enjoying an enviable local and continental fame.

After his death, a further work, "The Processus Integri" or "Complete Methods of Treating Almost all Diseases", was published in England by Dr. Monfort in 1693. It had been written by Sydenham for use by his son at Pembroke. The manuscript was entrusted to Dr. Monfort, who circulated a private copy after Sydenham's death. This copy was pirated in Nuremberg and then published in England by Monfort.

In 1845 Dr. Greenhill found some more papers of Sydenham's, which he published as "The Anecdota Sydenhamia". There was a fragment of a philosophical work and some notes for the "Processus". They had been collected by his pupil and friend, John Locke.



FIGURE II.

Engraving from Lely's portrait of Sydenham. Sydenham in his middle fifties. Reproduced by permission.

from this year until he died there is his published work available for study. It is an extraordinary thing that so little remains of his personality, indeed of his life, until his own observations. It is in accord with Sydenham's doctrine that his place in history is based on the evidence of his work rather than on knowledge of the man and his personality. Nevertheless, it is very frustrating to us to know so little of him prior to 1661.

Payne describes him thus: "He was of large and robust frame, his complexion reddish, his eyes grey, his hair at first brown, afterwards grey, worn long in its natural state." This description was based on a study of his portraits. Of these, there appear to be four, of which there have been many copies made. One of these four portraits was purchased in 1939 by the United States Army Medical Library and arrived in Washington just after the war began. (Figures I, II and III.)

It is pleasing to think that the influence of Stuart England on the United States has so lately been augmented.

In all these works the results of Sydenham's observations were published. There was first of all a description and study of the fevers which raged in England from 1661 to 1678. It was a serious attempt to classify the epidemic fevers and to ascertain the factors which influenced the rise and fall of such epidemics. Although not the first such work, it exercised a far-reaching effect on all who came after.

In addition to the epidemic study, there were many masterly descriptions of diseases, notably gout, smallpox, venereal disease and apoplexy. Almost any one of these descriptions would secure a place in history for its author.

There was much advice on treatment and on the use of sedatives and opium in particular. His favourite preparation is still known as Sydenham's laudanum. His cool treatment of smallpox we have already mentioned. He had two curious beliefs in treatment. The first was the efficacy of horseback riding as a cure. He used it much in phthisis, in gout, in chronic abdominal pains, and in sundry other conditions; and, he claimed, with much success. Actually it appears that this was the forerunner of the fresh air and exercise régime of modern times. Dr. Paris tells an excellent story of Sydenham's use of this form of treatment:

This great Physician, Sydenham, having long attended a gentleman of fortune, with little or no advantage, frankly avowed his inability to render him any further service, adding, at the same time, that there was a physician of the name of Robertson at Inverness who had distinguished himself by the performance of many remarkable cures of the same complaint as that under which his patient labored, and expressing a conviction that, if he applied to him, he would come back cured. This was too encouraging a proposal to be neglected; the gentleman received from Sydenham a statement of his case, with the necessary letter of introduction, and proceeded without delay to the place in question. On arriving at Inverness and anxiously enquiring for the residence of Dr. Robertson, he found to his utter dismay and disappointment that there was no Physician of that name nor ever had been in the memory of any person there. The gentleman returned vowing eternal hostility to the peace of Sydenham, and on his arrival at home, vehemently expressed his indignation at having been sent on a journey of so many hundred miles for no purpose. "Well," replied Sydenham, "are you better in health?" "Yes, I am now quite well; but no thanks to you." "No," says Sydenham, "but you may thank Dr. Robertson for curing you. I wished to send you a journey with some object of interest in view. I knew it would be of service to you: in going you had Dr. Robertson and his wonderful cures in contemplation: and in returning you were equally engaged in thinking of scolding me."

The other of his curious beliefs was his substitute for a hot-water bottle. He used the lively and vigorous warmth of young people applied directly to the bodies of the aged and debilitated. In the case of those afflicted with the colic a live female kitten was applied: "... and I am by no means ashamed of it, even although some few from amongst the arrogant, impertinent and supercilious despisers of everything common may sneer at me by reason of it." This custom evidently was derived from the Scriptures and is well described in the first chapter of the first Book of Kings:

Now King David was old and stricken in years; and they covered him with clothes, but he gat no heat. Wherefore his servants said unto him "Let there be sought for my lord the King a young virgin; and let her stand before the King, and let her cherish him, and let her lie in thy bosom, that my lord the King may get heat!" So they sought for a fair damsel throughout all the coasts of Israel, and found Abishag a Shunammite, and brought her to the King. And the damsel was very fair, and cherished the King, and ministered to him: but the King knew her not.

"The Processus Integri" was an astonishing book. It had an immediate success and was a best seller. Primarily on treatment, it contained 60 chapters on various diseases; some of these were summaries of his previous works and some were quite new. There were many superb short descriptions of disease, so good that today few can read them without profit.

Sydenham's works are characterized by his logical and lucid thought, by his splendid observation, by his power to express an idea in an unforgettable phrase and by his humanity and wisdom. Most of all they are characterized by his emphasis, repeated many, many times, of the appeal to experience rather than to authority. So it is, then, that the value of his work lies not so much in his study of epidemics, his descriptions of disease, his methods of treatment, his aphorisms, or even in his handbook of medicine, as in the new approach by the appeal to experience, and this can be understood better after a further glance into the past.

In the centuries which had passed since Hippocrates, medicine had entered upon very evil days. The Hippocratic or scientific method had fallen into disuse. The observations of Nature's ways, of patients, and of the natural history of disease had given way to the more fascinating pastime of speculation. Hippocrates himself proposed theories as to how the body and Nature worked, but he never let his theory interfere with his practice, which was based on experience and the lessons gained therefrom.

Unfortunately, with the Christian era and the doctrine that there must be only one healer and only one set of beliefs, the Hippocratic method lost its hold on medicine. The destruction of the library at Alexandria by a mob of fanatics and the prohibition of dissection of the human body, by Christians and Moslems alike, contributed greatly to this. The final blow was that the Church decreed that only such knowledge as it approved should be promulgated, and only by teachers it recognized. Just as faith played the main part in religion, so in medicine faith in the past, in the ancient masters and in the great Healer was to take the place of observation and experiment.

Galen, who believed that the soul was more lasting and more important than the body, was thoroughly approved by the Church. Added to this, he was very dogmatic and an energetic and forceful teacher. His impact was thus tremendous and lasting. Opponents of his teaching were regarded as ignorant by scientists. Those who expressed original thoughts, or made experiments, were persecuted by the Church and even burned at the stake for heresy or sacrilege. This was a long way from Hippocrates, who had had no patience either with the contemporary religious belief that disease was a punishment sent by the gods or with the view that certain diseases were divine or sacred. He believed that they had a natural cause, and the supposed divine origin was but due to man's inexperience.

There was still great respect and reverence for Hippocrates; but, as the centuries passed, medical ability was assessed not by what was known of what Hippocrates said or did, but by the number of links that could be quoted between the present and Hippocrates. Galen's dogmatism and teaching obscured reason to such an extent that later anatomists, forgetful that Galen's anatomy was that of the pig or the ape, claimed that human anatomy must have changed since Galen's day when they found it to differ from that which Galen taught.

The Reformation, and the invention of printing, gradually enabled man to throw off the dead hand of the past. In England there was a demand for better medical education. The College of Physicians was founded in the year 1518 by Linacre. The Company of Barber Surgeons was granted a charter in 1540. The Lumleian lectures in surgery were established, and Sir Thomas Gresham founded his college. But at the universities there was little change, except for the establishment of the Linacre lectures, and the Regius professorships in 1548. A seven-year period of study of the authorities and of Galen in particular was still required and little time was spent on the acquisition of practical experience.

Bacon, who was too indolent to do any scientific investigation himself, nevertheless pointed the way in his writings. He left to more energetic men the achievement of the scientific method of observation and experiment. Bacon urged the abandonment of the four idols, "accepted authorities, popular opinion, legal bias and personal prejudice", and the substitution of the inductive method of

reasoning based on experience. For truth was derived not from authority, but from experience.

The coincident work of Vesalius and his pupils was stirring the imaginations of original thinkers in every country. Freed by the Reformation from the dangers of heresy, Englishmen were about to inaugurate an epoch of scientific achievement whose splendours were comparable only with those of the reign of Elizabeth in literature. The demonstration by Harvey of the circulation of the blood was but the forerunner of many wonderful and original works, with which the names of Robert Boyle, Wren, Hooke, Sydenham, Locke and finally Newton are indelibly associated, in an era only surpassed by the Golden Age of Greece.

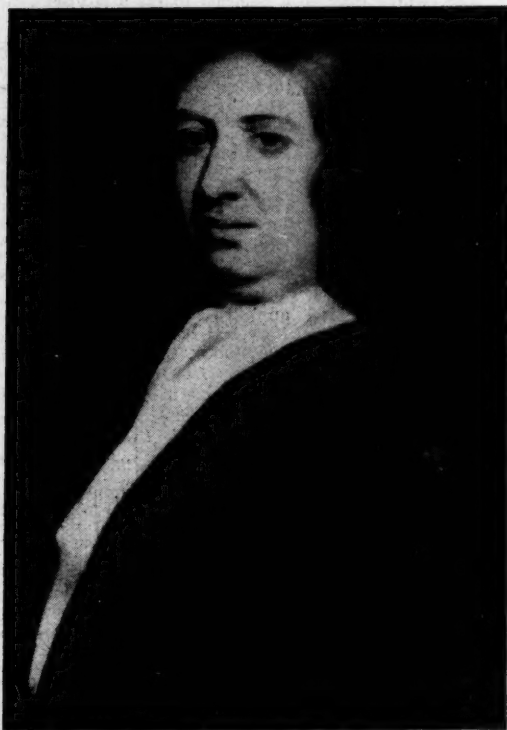


FIGURE III.

Photograph of Mary Beale's portrait of Sydenham, in Army Medical Library. Sydenham, aged sixty years. Reproduced by permission.

It remained for someone to do for clinical medicine what Vesalius had done for anatomy and Harvey for physiology. Sydenham was the man and, like the others, he drew aside the mystic veil which obscured reality. By his logic and original observations he was able so to mark the true path of medical progress that it has never again been lost.

The position prior to Sydenham was very well stated by Francis Bacon:

We are well aware that there existeth such a thing as natural history; full in bulk, pleasant from its variety, often curious from its diligence. Notwithstanding, whoever would take away from the same the citations of authors, the empty discussion, and finally the book learning and ornaments, which are fitter for the convivial meetings of learned men than for the establishment of a Philosophy, would find it dwindled into nothing.

Sydenham's attitude to medicine was: "In this I shall look for the solution of my question, to the careful observations of facts under the cognisance of our senses,

and not to the flimsy fancies based upon the uncertain foundation of opinions." His practice: "I then sat by the bedside and observed the effects of the medicine." His policy: "It is my nature to think where others read; to ask less whether the world agrees with me, than whether I agree with the truth, and to hold cheap the honor and applause of the multitude." This was his code of ethics:

Whoever takes up medicine should seriously consider the following points—firstly, that he must one day render to the Supreme Judge an account of the lives of those sick men who have been entrusted to his care; secondly, that such skill and science, as by the blessing of Almighty God, he has attained, are to be specially directed towards the honour of his Maker and the welfare of his fellow creatures; since it is a base thing for the great gifts of Heaven to become the servants of avarice or ambition. Thirdly, he must remember that it is no mean or ignoble animal that he deals with. We may ascertain the worth of the human race, since for its sake God's Only Begotten Son became man, and thereby ennobled the nature that He took upon Him. Lastly, he must remember that he himself hath no exception from the common lot, but that he is bound by the same laws of mortality, and liable to the same ailments and afflictions with his fellows. For these and like reasons let him strive to render aid to the distressed with greater care, with the kindlier spirit, and with the stronger feeling.

Many, however, will in no wise allow themselves to be regulated by these considerations, as evidently manifest both from their practice and their way of life; some are swollen up with pride and puffed out with the vain conceit of their knowledge; so that these matters

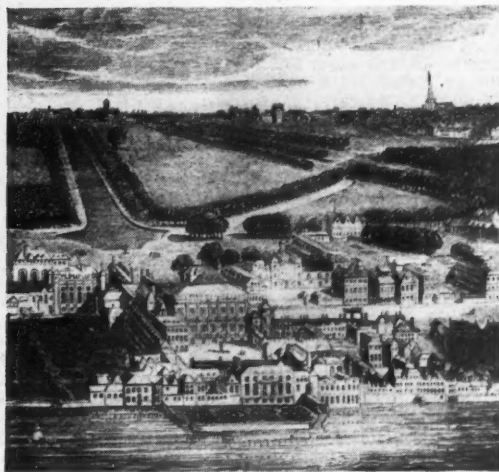


FIGURE IV.

Whitehall in the reign of James I. From Aubrey's "History of England". [Published before 1880 and publisher now out of existence.]

seem small in their eyes. They can only come down to them negligently and contemptuously. They care nothing for the unfortunates committed to their charge. The Supreme Being they either disown or disregard. The others either gape and grow greedy for gain, or else are borne away by the hopes of some small celebrity; in either case looking to their purses or to their fame.

In all cases it behoves each and all of these Physicians, who have the desire not only to *seem* but to *be* prudent and honest, to acknowledge and entreat the Divine Goodness, that from this they may look for wisdom and good fortune; and they ought not to be satisfied with simply giving health to the sick, but they should strive to add greater certainty to the art that they administer; and they should so direct their experiments that the science of medicine may grow day by day more clear and more efficient. In this way the human race may reap the advantages thereof generally,

and with safety even after they themselves have been laid in their graves.

In full consciousness of my high duty do I lay before the world this my method of treating fevers; founded upon my own observations.

Sydenham did not stay in London during the plague. He lived in Westminster and most of his patients were well-to-do and able to leave London, as were the other West End doctors—and Pepys. Westminster was almost a separate town from the City of London wherein "The Poore's Plague" raged. (Figure IV.)

But the danger came to my own doors and I was persuaded by my friends to add myself to the increasing list of fugitives. I and my family retired a few miles from London. I returned, however, earlier than my neighbours; and, as the calamitous violence of the disease still continued, I was necessarily called on, for the want of a better practitioner, to the relief of the sufferers.

Despite his small experience, he nevertheless gave an account of the plague and its treatment, but with an apology and explanation:

In respect to the therapeutics of the fevers in question I may possibly lay myself open to the charge of arrogance and temerity in venturing upon a dissertation upon this subject; inasmuch as, during the inroads of the late plague, I was, during the greater part of the time, many miles distant from London, and, as such, unfurnished with a multiplicity of cases. Those physicians, however, of far greater skill than myself, who, throughout all the stages of that scourging calamity, with danger all around them, and with the thousand shapes of death before their eyes, had heart and soul to stand at their posts, have hitherto shown no intention of laying before the world those observations upon the nature of this disease which their greater practice may have supplied them with. Hence it is that I crave of good men a mild judgment upon my undertaking, having laid before the world my own notions concerning a very deadly disease, as a superstructure to a limited number of my own individual observations.

Although the people of London no doubt were deprived of his wisdom during their trial by disease, nevertheless posterity has great reason to be thankful that Sydenham was spared to light a torch that was to illuminate medicine and the medical world for centuries. Had he stayed, he, whose habit was to sit by the bedside and observe what happened, would probably have soon been carried off by the plague.

In the year 1660 Sydenham was afflicted with gout and henceforth until his death he was able to study at first hand this disease, "*Dominus morborum et Morbus Dominorum*, The Lord of diseases and the disease of Lords". He painted a vivid and accurate picture unsurpassed either before or since. Every stroke of the brush was inspired by a twinge of his own suffering. He developed stones in his kidney and bladder and pointed out that stones developed either from the patient having lain for so long on his back, or from the secretory organs having omitted their functions for so long, or because the stone had been formed from a part of the same morbid matter. He described how the pain of the calculus was at first in the back, but then was followed by acute pain that followed the course of the ureters to the bladder thence into the testicle and into the thigh. He reported that the pain was often accompanied by hæmaturia and was aggravated or brought on either by driving on paved streets or by any exercise, so that the least motion distressed him.

In 1676 he developed hæmaturia. He had extreme pains in his joints, his appetite failed, and his strength was prostrated; swellings, too, in his legs and other symptoms equally dangerous supervened. He was very miserable: "Had I died at that time, death would have taken me away from the bitters of this world, not from its sweets; nor should I have resisted." These were distempers which even the art of Sydenham could only palliate, without hope of a perfect cure, but which if he has not been able by his precepts to instruct us to remove, he has, at least by his example, taught us to bear.

It was the effect of gout on his mind which prevented him from writing his book on chronic diseases, but it was gout, and a desire to correct his errors, which led him to

write "The Epistles" and the later works. In one of these he wrote on smallpox:

The first [smallpox] I have reverted to in order to polish up from the suggestions of an increased experience, those facts wherein I was before found wanting. . . . I will further own [in 1681] that over and above my wish to benefit the public, I wished so to pass the long tedious nights of winter, as to make my leisure serviceable, since I am now getting too old to go beyond my own house for company.

In 1683: "My health prevents me from troubling the world much more with medical treatises. In the one I am now publishing my hand trembles too much to hold the pen." Like his distinguished contemporary and fellow-sufferer, Pepys, he took a certain melancholy pride in his gout.

But (which may be a comfort to me and others that are afflicted with this disease, tho we are but moderately furnished with Money, and the graces of the Mind), so lived and so died, Great Kings and Potentates, Generals of Armies and Admirals of Fleets, Philosophers and many others such as these. To be short, this Disease of the Joints (which can scarce be said of any other) kills more rich than poor, more wise than Fools; nature demonstrating, as it were, with the Finger how just the Creator and Disposer of all things is, and how little he sides with Parties; for those that want something are wont to be abundantly replenished with another kind of good; and he allays profuse munificence by mixing an equal share of Miseries with it; so that it is everywhere inviolably decreed, that no man shall be perfectly happy, or altogether miserable, and that all shall partake of both lots; which mixture of Good and Ill, so convenient to our Frailty and Mortality, is perhaps very proper for us.

He wrote much on smallpox and left little for others to add to its clinical picture. Among those he treated for smallpox was his pupil, Dr. Dover, who compounded the famous Dover's powder. His cool treatment was in substance to keep the patient out of bed until his general condition became too weak, when:

The sitting position will probably make him faint. Putting these observations together, I fancy that I discern the finger of nature who determines when we should and when we should not keep to bed uninterruptedly. The appetites and sensations of the patient are thus better than the treacherous rules of Art.

The rest of the treatment was to see that his diet and medicines were light and agreeable. Despite his treatment he found that:

The Physician who has much to do with smallpox runs many risks to his reputation. The Vulgar are ever in the habit of ascribing deaths to the officiousness of the attendant, whilst physicians themselves catch greedily at the opportunities for slander. They make out their case before incompetent judges and procure most uncharitable verdicts. They act thus in order that they may build up a name for themselves upon the ruined reputations of others; a proceeding disgraceful to even honest artizans, doubly disgraceful to scholars.

London in Sydenham's time was ravaged by malaria, and Sydenham discussed the disease at length in his work on fevers. In the year 1632 cinchona bark was introduced into Spain, having been sent there for the treatment of the wife of the Count of Cinchon. It was tried unsuccessfully on Leopold of Austria in 1652, but nevertheless its use began to spread. Cinchona bark appears to have been introduced into England in 1655. It was occasionally used by various English physicians, one of whom was Dr. Brady, but it was not until 1663 that its use became more general.

Sydenham has often been given the credit for the proper and general use of the bark in malaria. That he was the first to use it as a tonic in other diseases seems certain. However, it is not until the third edition of the "Methods" that he emphasizes the use of bark, with full directions as to how it should be given. Talbot had already used it for much longer than Sydenham, and certainly made much more out of it, having disposed of his cure for malaria as "The English Remedy" to Louis XIV.

It is today somewhat immaterial who was the first English physician to use cinchona bark, but it was

Sydenham's practice to use it by the time the "Processes Integri" was published. It was the wide circulation of this book which popularized the use of the bark as he recommended. Sydenham has this to say of the bark: "With many persons it is in disgrace at present for being so sure a cure; as it was in disgrace at first for being so new a cure. The common fate of both the best men and the best remedies."

He made great use of sedatives in many diseases. In the more severe colics and in the iliac passion, which he recognized as something more dangerous and more severe than most other abdominal conditions, he departed greatly from current practice by the use of sedatives rather than purges. Apart from the use of the young kitten, his treatment is a fair picture of the conservative treatment of appendicitis. His description of the iliac passion emphasized that the pain is at first generalized, then becomes fixed to a point; that as the pain increases, so does the vomiting until the motions of the bowels become reversed, and the faeces are vomited forth. He gives an excellent differentiation of this condition from renal and ureteric colic (the nephritic spasm).

His rules for the use of opium should be compulsory reading for every resident medical officer and sister. Of doses:

What will suit a man of quiet and regulated spirit will be insufficient for one of a more turbulent temperament.

The effect and not the quantity regulates the dose: all that should be done is to give the doses at intervals so regulated as to enable us to ascertain the effect of one before we administer another.

Infants require paregoric less than adults, and the tender age of infants ill bears narcotics.

Laudanum must be given at once: and the dose must be large enough, and repeated enough to meet, and more than meet, the symptoms; it must subdue them.

When Laudanum is fairly begun with, there must be no disturbance.

On the other hand, Sydenham warned against the use of sedatives for a loose cough and he emphasized that expectorants were quicker to relieve such a cough, and produced less ill effects. This important principle is now almost entirely forgotten, and collapse of the lung is often produced by the use of sedatives to prevent a cough which would eject the secretions to the exterior where they can do no harm.

A few of his pictures of diseases will serve to stimulate the appetite for more.

Of pseudocyesis:

This is commonest with widows, and with such persons who become advanced in life before they are married; and such persons shortly, on their own judgement, but much more on that of their oracles—the midwives—fancy the motion of a foetus, sicken like women in the family-way, swell about the nipples, have a show of milk, and on the strength of all this, order baby linen

for the child that is to be, and prepare things for its reception into the world. The belly, however, decreases as it increased, and so undeceives them.

On syphilis or true lues:

A spot like that of a measles appears on the glans. The aforesaid pustule becomes an ulcer. At first it resembles the aphthae in the mouths of infants. It spreads, however, day by day, becoming broader and deeper, whilst the edges grow hard and callous.

When a gonorrhoea has been unduly protracted, or a taint has been imparted to the blood, lues arises. Buboos appear on the groins. There is pain in the head, limbs and joints, especially when the patient is warm in bed. There are crusts and scurves in various parts of the body, which are yellow, like honeycombs. The worse the scabies, the easier the pains on the pericranium, and shoulders and arms. There are exostoses.

There is inflammation and caries of the bones. Phagedenic ulcers in various parts of the body, most in the fauces. These spread gradually along the fauces and palate, and destroy the cartilage of the nose, which then falls in. The caries, ulceration and pain increase. Limb by limb the patient drops off, and his lacerated body, a burden on earth, falls into the grave.

He used mercury for treatment and insisted that it must be pushed until salivation occurs. He thought it was the salivation that cured, not the mercury. He instructed the patient to rub it in with his hands; but, notwithstanding mercury, he recognizes that true venereal lues, the common pox, "is a hard knot and requires a hard wedge".

On gonorrhoea:

The Sick is first seized with an unusual pain in the Genitals, with a certain Rotation of the Testicles afterwards; if he be not circumcised, a Spot like the Measles coming out, as to the Colour and Bigness, seizes some part of the Glans, and presently after the rise of this Spot, a Liquor distils gently like Seed, which daily receding both from the Colour and Consistence of Seed, grows at length yellow, but not so deep colour'd as the Yolk of an Egg; and in a more virulent and intent Pox, it is not only green, but mix'd with a wat'ry Humour much tinctur'd with Blood. The said Pustule turns at length to an Ulcer which is at first like the Aphthae in Children's Mouths, which eats daily deeper and wider, and the Lips become callous and hard; but it is to be noted that the Pustule now mention'd is seldom accompany'd with a Gonorrhoea, in those who have either before had a Gonorrhoea, or are circumcised; for their Glans being harden'd by being often expos'd to the Air, and by being frequently rubb'd with Rags, does not so easily receive the Infection: and therefore those that are so circumcised are scarce ever troubled with this Ulcer of the Glans. A Gonorrhoea is occasion'd only in this manner: Other Symptoms presently follow this; at first a great Sense of Pain in the Yard as often as it is erected, and it seems as if it were preat with a strong Hand; this chiefly happens in the Night, when the Sick begins to be hot in his Bed; and this painful Constriction of the Yard in this State of the Disease, I count

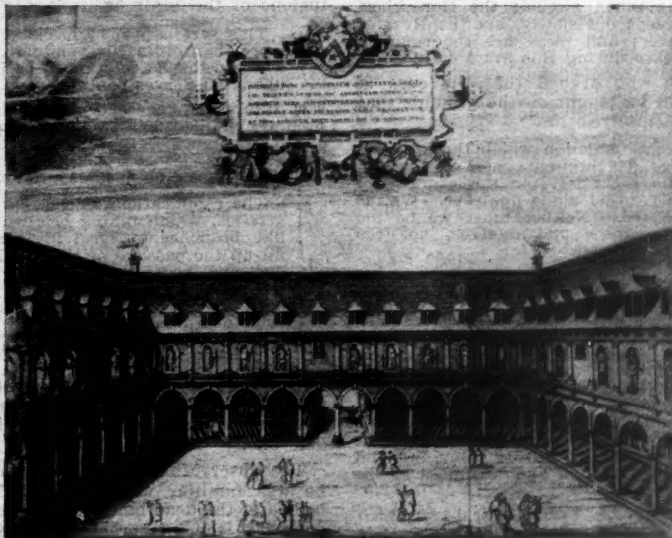


FIGURE V.
Gresham College. (From John Ward's "Lives of the Professors of Gresham College", folio, London, 1740.)

the Pathognomonick Sign. The Yard is also bowed by a Contraction of the Bridge, which being according to its Nature stretch'd in the Erection, occasions a violent Pain: There is moreover a Heat of Urine, which most commonly is scarce perceiv'd in making water, but presently after the Patient is violently pained, thro' the whole Duct of the Urethra, especially at the Glans, and sometimes also the Urethra being excoriated by the continual Flux of sharp Matter, and Nature being over-officious in breeding new Flesh, substitutes a certain loose and spongy Flesh, which growing daily bigger and harder, makes Caruncles which so stuff the Urinary Passages, that at length the Urine cannot pass; and these Caruncles also emit a certain Ichor from little Ulcers growing upon them, and much obstruct the Physician in the Cure, and miserably afflict the Sick. Moreover, it happens often, that the Sanies, which ought to be carried off by the Gonorrhoea, being cast upon the Scrotum, either by reason of violent Motion, or by the use of Astringents, occasions violent Pain, or an Inflammation of the Scrotum, sometimes one, sometimes both sides being much swell'd; the Gonorrhoea in the meanwhile proceeds but slowly, but the Heat of Urine is as bad as ever; and these are the common Symptoms of this Disease during this State of it.

Sydenham chided those who argued that the cure of venereal disease should not be taught on the grounds that men had brought it on themselves.

If we reject all cases of affliction which the improbance of human beings has brought upon themselves, there will be but little room left for the exercise of mutual love and charity. God alone punishes. We, as best we can, must relieve. Neither must we be too curious in respect to causes and motives, nor too vexatious in our censorship.

Of rickets:

There is a softness and laxity of the parts, weakness and languor, sluggishness and torpor, and besides this, unequal nutrition. Thus the head is oversized, and face overflorid and overfull, whilst the parts below are emaciated. The joints project in nodes, the wrists somewhat more than the ankles. The ends of the ribs swell. The bones become curved, especially the tibia and fibula. The teeth come late and painfully, are loose in their sockets, and fall out in bits. The chest is narrow at the sides and pointed in front, the belly being full and the hypochondrium tense. Cough and weakness of the lungs supervene.

On phthisis:

The lungs being thus repleted with pus, from them flow purulent streams into the blood, which cause a sort of putrid fever, whose access is towards night, and its solution towards the morning by a profuse and weakening sweat. Lastly, towards the completing of this tragedy, comes on a diarrhoea colliquativa, and death is at hand. Where this cough hath continued long, then the patient begins to sweat at night, which is the first sign of a consumption coming on; and after this he begins to have a hectic heat, which withers his body, and leaves on his face, especially his cheeks, a light redness, and presently after he begins to spit up yellow matter like pus, but not it, and when the mischief shall have so far advanced, that both nocturnal sweatings and the diarrhoea colliquative meet together, the disease is consummate, and death at hand, though the patient all this while hath a serenity of mind, and flatters himself with an opinion of recovery which is usual in this disease even to the very last.

The frequency of consumptions in London is for that we live here in a perpetual mist, the sun not being powerful enough to dissipate the clouds: and with this mist are mixed the fumes that arise from the several trades managed here, but especially the sulphur and fumes of the sea-coals with which the air is repleted, and these being sucked into our lungs and insinuating into the blood itself, give an occasion to a cough.

He did not call it smog.

On apoplexy:

To this disease are apt men of fifty years and upwards, of full and gross habits of body, who have large and short necks, prominent bellies, that drink much wine. It invades such persons at any time of the year; but especially between the winter solstice and vernal equinox, and the occasion of it is the having eat something that they cannot digest, or a high debauch; unwanted exercise or any other thing that raises an

unusual commotion in the blood. They fall down suddenly and are taken with a profound sleep joined with snoring; and they are deprived of all sense of voluntary motion, but their respiration is not much perturbed. In the meantime, their pulse is very good and full until they be near death. It comes upon them for the most part without any presentation of this last; but sometimes there is a presentation of plenitude and straitness about the head as if it were tied hard with a ligature; and likewise a vertigo, which signs foretell an apoplexy to be near to such persons under the circumstances before described. Sometimes there is in the very fit a palsy of one side of the body, which comes on in the same moment with the apoplexy, and is a solution of it. Sometimes there is a resolution of the sphincter ani, so that clysters injected do not stay, but are thrown out as fast as they are thrown in.

He distinguishes the apoplexy *ex sanguine* caused by an extravasation of blood and an effusion thereof upon the brain in the like manner as apoplexies are caused by contusions of the brain by falls.

This sort happens especially to ancient men, who are more than ordinarily sanguine, and is altogether deadly. There being no solution to be had of the morbid cause upon the nerves of a palsy as in the phlegmatic sort.

For this type venesection was the treatment, from the jugulars if there was no relief by removing blood from the arms.

To the causes of apoplexy Sydenham added:

The ramifications of visciduous coagulated matter in the arteries, which taking origin in the heart and growing like branches of coral in those vessels do by degrees fill up the passage of the blood, and at last hinders this due and necessary afflux to the brain—apoplexia ex pituita, for which venesection is contra-indicated. This sort, though very dangerous, doth not yet so certainly infer death as the other.

He further pointed out that symptoms resembling an apoplexy were seen in the fevers. In addition to treating the attack, he believed that some prophylaxis should be made by bleeding the patient before the season for the apoplexy approached, a policy which seems a very reasonable one.

The observations in apoplexy and elsewhere show that he was familiar with some of the changes seen in the bodies of the dead and was able to apply the knowledge so gained to the interpretation of disease. He thus pointed the way to Morgagni in morbid anatomy.

Sydenham concluded his treatise on gout and dropsy thus:

This is what I have to say concerning these two diseases—whether the things I have said be true or false can only be known by him who tests them by the same practice which supplied them; and then he must be as careful and as curious as I have been before him. If, in the little I have written, I have been no man's follower, but Nature's only, I am sure that the wise will give me their attention; since such best know that there are two sorts of men who more especially are lets and hindrances to medical progress.

First come those who, adding nothing to medicine of their own, are angry at the most trifling additions of another; masking their sluggishness under the show of a reverence for the ancients; from whose practice they dare not swerve the breadth of a nail. Yet how can we argue that whilst other arts touching the interest and benefit of mankind have been advanced by moderns, without discrediting the ancients, medicine alone was perfected by them? Could the mariner's compass have been discovered except by the neglect of those authorities whose best means of navigating were the constellations, and the coastlines? Is not the naval architecture of Western Europe better than that of the shipwrights who made the navies of Actium? And if these be so, are Antony and Augustus, therefore, bad captains? The improvements of moderns upon the ancients are innumerable. And those who take credit for them are no more supposed to violate the reputation of their ancestors, than the son who increases his paternal estate insults the father who left it. The whole philosophy of medicine consists in working out the histories of diseases, and applying the remedies which dispel them; and experience is the sole guide. This we attain by observing the method that right reason

dictates, the suggestions of common sense rather than of speculation.

Sydenham's attitude to fevers was very clear:

These are my observations on fever and its symptoms. In stating them I have seriously been on the guard against any imaginations of my own. I have dealt in no fancies. In a candid and sincere speech, in a spirit free and unrestrained by hypotheses, have I published their natural history and their symptoms; and, if I have added their treatment, I have added it in a similar spirit of good faith and caution.

And if the ardent desire of first discovery and the establishing of some methods of protecting human life, more certain and less unsteady than the methods hitherto applied, shall have drawn me forward into fresh paths, and into paths that none before have trodden, I hope and trust that men of true learning will impute to me neither the contempt for the better judgements of other men, nor the love of new fashions or practice. I take great courage from the results that have, as yet, confirmed my investigations; and I trust to posterity as a witness for the future.

A murderous array of diseases has to be fought against, and the battle is not a battle for the sluggard. Day by day is there the combat against the life of man, and there is neither truce nor quarter. Many die by violent deaths; but with the exception of these, two thirds of our race die by fevers. Continuous attacks, and daily victories over strong men in the flower of their age, on the part of the disease; inefficient resistance, and specious, though confident, speculation on the part of the physician—these it was that dissatisfied my reflections, and showed me the worthlessness of the vain crotchets of fanciful men, when the question was a question of lost health seeking restoration, and when, in the face of the promises of braggart dogmatists, those patients who had recourse to such assistance, fared neither better nor worse than if the resources of art had been neglected altogether, and their trust had been put in nature alone.

I have been very careful to write nothing but what was the product of Fruitful Observation and neither suffered myself to be deceived by idle speculations nor have deceived others by obtruding anything upon them, but downright matter of Fact.

In Latham's words: "Sydenham took cases as he found them, but asked what they taught not what they proved. This simple recognition of the priority of direct observation, and its paramount supremacy to everything else, was the proclamation of what is now an old truth, of what was then a new one, and of what is always a great one."

Enough has been said of Sydenham to show that he possessed the synthetic power of genius which enabled him to combine his observations with pictures of disease, the value of which remains unaffected by change of opinion or increase in knowledge; that he did subscribe to the appeal of experience rather than to authority; that he was able to discard the four idols as demanded by Bacon. It is incumbent upon us all to make sure that we, too, are able to discard the appeal to authority by learning the lessons of experience and observation. No reverence for a man's learning, nor respect for his erudition should blind one to faults in his premises or in his reasoning, for as Markham observed of Laennec: "Laennec's vast authority would naturally tend to immortalize even error when it proceeded from himself."

Wilfrid Trotter, in his celebrated oration on the commemoration of great men, tells how J. J. Waterston, an engineer who interested himself in mathematical physics, wrote a paper in 1845 on the molecular theory of gases, which was ten or fifteen years in advance of his time, and anticipated much of the work of physicists no less eminent than Jules, Clausius and even Clerk Maxwell. The only contemporary judgement on his paper that survives is that of the referee of the Royal Society to whom it was submitted. The referee reported that: "The paper is nothing but nonsense." What Waterston might have accomplished if he had had the recognition and the encouragement upon which this genius seems to have been unusually dependent is beyond conjecture. He did not get them. His work lay in utter oblivion for forty-five years until it was exhumed by the pious efforts of Rayleigh.

Trotter charitably suggests that this judgement was due not to prejudice, as lesser men might think, but to the sheer inability of contemporary opinion to distinguish between a new idea and nonsense. Surely there is another and better explanation. The judgement was probably based on an assessment of the man and his fame and authority rather than on his facts and his logical and rational deductions from them.

I recall a young man who not long ago desired to take a doctorate in medicine by thesis. He consulted a senior member of the profession as to what was required. The latter said: "Now that will call for about 150 references." Thus the appeal to authority is still invoked. A follower of Sydenham would surely have replied: "Now that will call for 150 of your own observations."

Not until the student will go to the wards or laboratories to solve his problems rather than to books; not until he will quote his own experience, however meagre, rather than the opinions of an imposing array of authorities; not until then will the lessons of history have been taken to heart and not until then will he be well armed to fight against disease with an independent and inquisitive mind. The greatest danger that confronts us all is a return to the Dark Ages in which thought and experiment were condemned. The trend which in certain countries now is to shackle freedom of thought, to destroy books which express ideas other than the established and approved ones, and to liquidate all who offend the chosen beliefs, could well lead us to an age darker than any that has gone before.

This cannot happen if the appeal is to experience and not to authority. The proper relationship of these is expressed in the beautiful words of Dr. Latham, one of Sydenham's translators, as he led his students into the wards of St. Bartholomew's:

In entering this place, even this vast hospital, where there is many a significant, many a wonderful thing, you shall take me along with you, and I will be your guide. But it is by your own eyes, and your ears and your own minds, and (I may add) by your own hearts, that you must observe and learn and profit. I can only point to the objects and say little else than "See here and see there".

Sydenham died in the year 1689, and was buried in Saint James's Church, Piccadilly. It is said that in the county of Dorset and Wynford Eagle all trace of the Sydenham family is obliterated except for one field still known as Sydenham's field. It is probable that, since the bombing of Saint James's Church, little trace of his grave remains.¹ But just as the field in Dorset still exists and is productive, so the field of Sydenham's work is still fertile and if cultivated will yield good crops. I have no doubt that Sydenham himself would prefer his works to be his memorial rather than a stone which marked his grave.

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¹ The Vicar of Saint James's Church wrote in February, 1955, to say that the memorial tablet to Thomas Sydenham was still in good condition. It was reerected on the wall of the North vestibule above the stairs leading to the North Gallery. The inscription reads:

*Prope hunc locum sepultus est
THOMAS SYDENHAM
Medicus in omne avum nobilis
natus erat A.D. 1624
vixit Annos 65
deletis veteris sepulchri vestigis ne rei memoria interiret
hoc marmor pont
jussit Collegium
regale medicorum Londinense A.D. 1810
Optime merito.*

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Appendix: Sydenham's Aphorisms.

I think it is better to assist Mankind than to be commended by them; popular applause being lighter than a feather, or a bubble, and less substantial than a dream.

That practice, and that alone, will do good which elicits the indications of cure out of the phenomena of the disease itself. That practice, and that alone, will do good which elicits the indications of cure out of the phenomena of the disease itself. True practice consists in the observations of nature; these are finer than any speculations. Hence the medicine of nature is more refined than the medicine of philosophy.

Weak minds only scorn things for being clear and plain.

The usual pomp of medicine exhibited over dying patients is like the garlands of a beast at the sacrifice.

The more the pus the more the fever, since the absorption of pus into the blood, through the veins, according to the laws of circulation, supplies the fuel of the disease.

If the patient survive, he may attribute it to some lucky accident but not to any skill of mine.

Praise and blame unworthily given are equally violations of truth.

It is not, and it has not been my habit, to involve simple matters in circuitous and irrelevant discourse; and so to conceal the matter in hand, as the Nile conceals its sources.

All this is part of human nature—which ever loves thus to contemplate the exterior surface of things, better than to make itself cognisant of the deep and more concealed truths which require labour in the extraction. Hence dabbles in science lean upon the opinion of the vulgar, and so, have things their own way; while the closer observers are received with calumny and ill words. Such however they bear with equanimity, satisfied with the approval of a mere minority.

It was followed, a few hours after, by spasms, which were followed in their turn by relief—the relief of death.

Meanwhile my fame is in the hands of others. I have weighed in a nice and scrupulous balance, whether it be better to serve men, or to be praised by them, and I prefer the former.

Gout will take up its quarters even in a young subject, and its empire will be no government, but a tyranny.

Exercise guards against the stone; which a sluggish life favours.

I confidently affirm that the greater part of those who are supposed to have died of gout, have died of the medicine rather than the disease—a statement in which I am supported by observation. If, however, any one will try the virtue of such external medicines as are reputed to be undoubted anodynes, let him guard against imposing on himself by applying them towards the decline of a particular fit (—1st attack), a time when the pain is about to cease of itself but rather when a fit is coming on. He will then see the rottenness of his support and the vanity of his expectations.

For the formation of a right judgement in these matters, there is nothing so beneficial as the exact observation of the natural phenomena of the diseases themselves.

The pomp and dignity of the medical art is less seen in neat and elegant formulae than in the cure of diseases.

Hiccup is often the forerunner of death.

Chance has ennobled many a worthless medicine.

Honours and riches are less in the eyes of good men than virtue and wisdom.

Concerning the treatment I shall at present say nothing, although many know that I have dealt with it successfully; nevertheless I do not feel that my attention has been proportionate to the importance of the disease, hence I cannot with proper confidence publish any doctrines concerning its cure.

Our modern doctrine is a contrivance of the word catchers—the art of talking rather than the art of healing.

The method of practice is, as taught by no untrustworthy instructor, — Experience.

AN OUTBREAK OF LEPTOSPIROSIS IN NORTH QUEENSLAND.

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Babinda.

DURING the period from July to November, 1954, 58 cases of leptospirosis were investigated by the Innisfail Field Station of the Queensland Institute of Medical Research. Forty-two of these patients came from the Babinda area. The incidence of leptospirosis in the Tully, Innisfail, Gordonvale and Mossman areas was not increased in proportion, and did not differ significantly from that seen in previous years. The 42 patients infected in the Babinda area (in Division 3 of Mulgrave Shire) represent the largest outbreak of the disease during the cane-cutting season since work commenced at the Field Station in 1951.

The diagnosis was established by agglutination tests on paired sera in each case; in addition, leptospiræ were grown in blood culture from 32 of the patients. An attempt is made in the present paper to analyse the epidemiology of this outbreak and to correlate it with the public health measures in use in the area.

Epidemiology.

The infecting serotype was *australis* A in 28, *canicola* in three, and "Esposito", "Robinson", *hyos* and "Kremastos" in one each. One patient may have had a mixed infection with *hyos* and "Sawajizak". In six the diagnosis between *australis* A and "Esposito" was not possible on the serological tests. Thus 35 were infected with *australis* A or the closely related "Esposito".

Thirty-seven patients were cane-cutters, and one was a cane farmer who had cut his own cane; all these were

men aged seventeen to forty-four years. Thirty-four were infected with a member of the *australis A* serogroup. One schoolboy is represented twice ("Kremastos" and *hyos* infections), and his case has been described elsewhere (Doherty, 1956). Another schoolboy was infected with *australis A* or "Esposito". A woman in Babinda town, with no history of cane field exposure, had the mixed infection.

The places at which the patients were infected are shown in Figure I. It can be seen that the incidence of cases follows the rivers, as has been found in previous studies (Derrick *et al*, 1954). Certain areas, well recognized as foci of leptospirosis in previous years, again produced a large proportion of cases. Eleven were infected in the

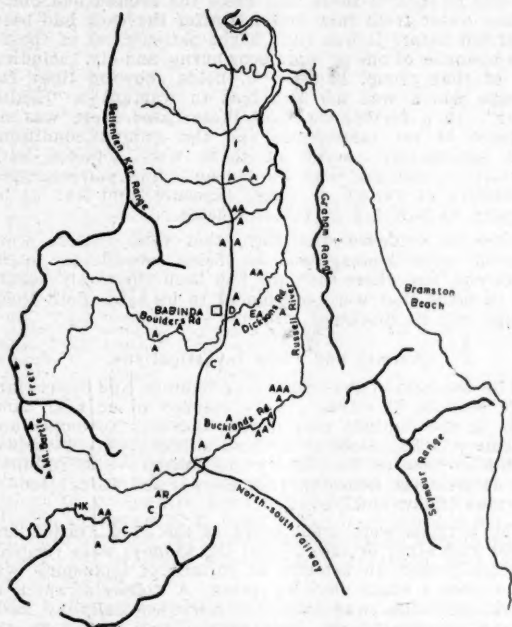


FIGURE I.

The Babinda area, showing the probable sites of infection in the 42 cases of leptospirosis. "A" indicates site of infection in a case of *australis A* infection; "B", *australis B*; "E", "Esposito"; "C", *canicola*; "K", "Kremastos"; "H", *hyos*; "D", double infection with *hyos* and "Szwajizak".

Mirriwinni-Bucklands Road area, nine in the Bartle Frere area, and ten in the area along Babinda Creek, including two in Babinda town.

A number of farms had more than one infection. Thus four patients came from one farm on Bucklands Road; three became ill on July 9 and the fourth on August 28. Two farms at Bartle Frere had each two cases of the infection. The dates of onset were October 26 and 29 and October 12 and 14 respectively. In these cases it seems likely that the patients were infected at the same time. Three other farms produced two cases each, but in each instance they were some time apart. In all, there were 14 cases of leptospirosis on these six farms.

The highest incidence of the disease was in July and August. There were 13 cases during July, 15 cases during August, four during September, six during October and four in the month of November. There were several short periods of high incidence; 12 cases had their onset between July 9 and 15, seven between August 10 and 16, and six between August 28 and September 1. Although there were some differences in the geographical distribution of cases in the various months, these differences did not reach statistical significance. For example, the Bartle Frere

area provided three out of 13 cases in July, and two of 15 in August, but four of six in October.

A close correlation can be demonstrated between the incidence of leptospirosis and the rainfall. This is shown graphically in Figure II and can be analysed as follows. Between June 27 and July 3, 2.78 inches of rain fell, and this was followed by 12 cases between July 9 and 15. On July 11, 0.30 inch fell; otherwise there was no rain until July 29. The only case in this period was that of a schoolboy who was probably infected while pig-hunting in wet scrub.

There was fairly continuous rain, totalling 13.90 inches, from July 29 to September 10. A steady stream of cases occurred, 19 patients falling ill between August 10 and September 15. The rest of September was dry, and there were no further cases.

Between October 3 and 7, 5.69 inches of rain fell, 4.40 inches falling on October 3. Three cases followed, on October 12, 14 and 16, nine to thirteen days after the heavy rain.

From October 14 to 26, 6.15 inches of rain fell; patients became ill with leptospirosis on October 26, 29 and 30, and on November 4, 5 (two) and 8.

Thus, with the exception mentioned above, all the cases can be correlated with a period of rain. The average daily rainfall at Babinda post office for the period July to December, 1954, was 20 points; the average rainfall to 9 a.m. on the tenth day before the onset dates of illness in each of the patients was three times this amount, being 61.3 points. The averages from the eighth to the fourteenth days were 31 to 37 points, and while higher than the over-all average are much less than that for the tenth day.

It must be made clear that the total rainfall in this period was not higher than Babinda's average, but monthly rains were heavier than average during August and October. These rainfall figures are to be found in Table I. The total rain for the equivalent period in 1950, when about the same number of cases was recognized (even including those designated "pyrexia of unknown origin", some of which may not have been leptospirosis) was very much higher (Gordon, 1951).

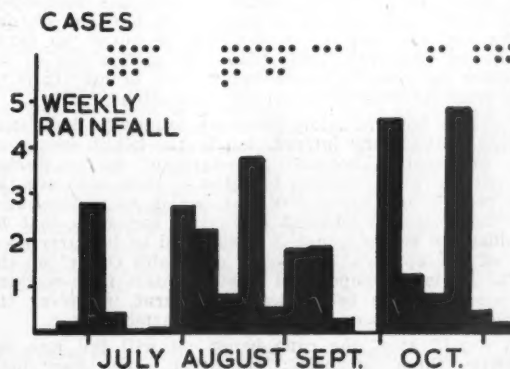


FIGURE II.

Time relation between cases of leptospirosis and rainfall at Babinda.

This close correlation with rainfall is in agreement with previous epidemiological investigations in North Queensland (Derrick *et al*, 1954). The close association between *australis A* infections and cane workers in Division 3 of Mulgrave was stressed in that paper, and also in a more recent article (Derrick, 1956).

Public Health Measures.

One factor which influences the occurrence of leptospirosis in cane workers in North Queensland, is the enforcement of public health measures by officers of the

Department of Health and Home Affairs. Some preliminary explanation is necessary before this factor can be assessed.

Cane cutting commenced in the Babinda area on June 7, 1954, and was carried on continuously until January 11, 1955. Thus the season had been in progress for four weeks before the first of the outbreaks occurred.

The prevention of leptospirosis in North Queensland is the concern of a group of Well's Disease Inspectors, who act under the provisions of *The Rat Prevention and Destruction Regulations* of 1942. The measures adopted are as follows:

1. Cutters are encouraged (but cannot be compelled) to wear protective clothing, especially adequate boots. This measure is not popular with cutters, and few would receive any protection against leptospirosis from their clothing.

2. Farmers are compelled to keep all garbage and waste in such a way that it does not furnish food for rats or bandicoots. They are also compelled to keep down undergrowth and grass that may provide rat harbourage.

TABLE I.
Monthly Rainfall at Babinda (in Points).

Month.	Average (24 Years).	1954.	1955.
June	824	485	554
July	535	276	1328
August	454	901	274
September ..	479	350	882
October	502	1186	351
November ..	634	140	1654
Total ..	3428	3339	5043

3. Canefields are inspected before cutting. A block that is considered to carry a risk of leptospirosis, either by the extent of rat damage or due to the ground conditions (in the words of the Act, "where such field is low-lying, badly drained, or wet"), is placed under a "Health Order". This order forbids cutting until the cane has been effectively burnt. The criteria of an effective burn, as set out in the Act, are that the cane should be burnt "so as to remove or effectively mitigate to the satisfaction of an inspector the hazards which have arisen or are likely to arise from rat, mice or bandicoot infestation".

Most cane is burnt before being cut, usually for industrial reasons, without any intervention by the health inspector. This intervention becomes necessary, of course, during wet periods when burning is difficult; these also are the very periods of greatest risk of infection by leptospirosis. The inspector can suspend cutting in any cane that he considers to be inadequately burnt, and to be carrying a risk of leptospirosis, by placing a "Health Order" on the block. He is not empowered to stop cutters from working in cane that has been adequately burnt, whatever the ground conditions or the amount of surface water.

In a mill area, the cane being cut will fall into the following three categories: (i) Green cane. Very little cane for milling is cut when green. However, in the early part of the year cane which is to be used for planting must be cut when green. For this purpose it is customary to choose rat-eaten cane that would not give a high sugar yield. (ii) Cane under a "Health Order". This is considered to be dangerous. It cannot be cut until well burnt, and the cutting would be kept under close supervision. (iii) The remainder. This will have been considered to carry little risk of leptospirosis; burning will not have been supervised as closely, and may be incomplete, especially during wet weather.

The 38 cases occurring in canefield workers may be looked on as representing a breakdown of the preventive methods. With this in mind it is of some interest to analyse the circumstances in which the patients were infected.

All patients were later questioned about the condition of cane which they had cut, and field reports on their movements were obtained. Three patients were infected while cutting green cane for plants, 11 were infected while cutting cane which was under a "Health Order", and 24 were infected on farms that were not under a "Health Order".

Four of the 24 patients infected on farms considered to be safe were probably infected while cutting cane after an accidental fire. In such a case, in which a larger area of cane is burnt than was intended, a number of gangs may be called on to deal with the cane before it spoils. Such a burn must of course be classed as effective, for a poor burn would not escape control. There would be a longer delay than usual between burning and harvesting, and in each of these four cases the ground had much surface water from rain that fell after the cane had been burnt but before it was cut. Eight patients out of the 24 gave histories of one or more poor burns, and six, including two of that group, had cut in fields showing light rat damage which was not sufficient to warrant a "Health Order". In a further eight of these cases there was no evidence of rat infestation, and the ground conditions were satisfactory; seven of these were infected with *australis* A and one with "Robinson". The patients gave no history of swamp or scrub exposure, and had to be accepted as infected in the canefields.

There is evidence, therefore, that cane cutters were infected with leptospirosis in fields considered to be dangerous, but where the cane had been effectively burnt; and in fields that were considered to be safe. Both these groups will be discussed later.

Animal and Field Investigations.

With the help of the children of Babinda and Mirriwinni State schools, 52 animals were trapped in or near canefields in the Babinda area during October, November and December, 1954. Sixteen of these animals were identified as *Rattus conatus* Thomas, two as *Rattus rattus* (Linné), one as *Melomys littoralis* (Lönnberg), and 32 as *Isoodon obesulus* (Shaw and Nodder).

The animals were transported to the Field Station and killed with ether or chloroform; the kidneys were removed aseptically and an attempt at culture of leptospiræ was made from a small piece of cortex. A kidney scraping in a drop of saline was examined microscopically by dark-ground illumination for leptospiræ; if any were seen, the remaining kidney was ground with alundum and suspended in saline, and 2.5 millilitres were inoculated intraperitoneally into a guinea-pig. Blood was taken for serological tests, and the animal was examined for lung and intestinal parasites. The carcass was placed in formalin and later sent to Brisbane for identification. The results obtained are set out in Table II.

Of the 16 specimens of *R. conatus* examined, leptospiræ were demonstrated in the kidneys of nine, by direct microscopic examination (seven), by culture (seven), or by guinea-pig inoculation (five). The strain was isolated from eight and identified as *australis* A. Isolation failed in one case, but the serological reactions of sera from the rat and an inoculated guinea-pig suggest that the leptospiræ seen on direct microscopy also belonged to the *australis* A serotype.

Eleven of the 16 specimens of *R. conatus* had antibodies against *australis* A and "Esposito" to a titre of 100 or greater. In three of these no leptospiræ were demonstrated in the kidneys by any technique. From one (Rat 48) leptospiræ were grown on culture from the kidney, but no antibodies were demonstrable in the serum. Kidneys of Rats 41 and 56, in which leptospiræ had been seen, were inoculated into guinea-pigs and produced no febrile reaction. The guinea-pig inoculated with Rat 56 kidney developed antibodies against the *australis* A serogroup; no serological tests were performed on the guinea-pig inoculated with Rat 41 kidney, but a later pig, inoculated with culture of the Rat 41 strain, remained afebrile but developed antibodies against *australis* A and "Esposito". It is possible that antibodies present served to protect the

TABLE II.
Animals Investigated in Babinda Area, October to December, 1954.

Animal Number.	Species.	Place Trapped.	Kidney Examination for Leptospiræ.			Agglutination Titres in Serum.							
			Direct Microscopic Examination.	Culture.	Guinea-pig Inoculation.	australis A.	"Esposito."	australis B.	icterohæmorrhagiae.	canicola.	medanensis.	"Kremastos."	"Szwajizak."
R.38	<i>R. rattus</i> .	Dicksons Rd.	—	—	N.D.	—	30	—	30	—	—	—	—
R.54	<i>R. rattus</i> .	Bucklands Rd.	—	—	N.D.	—	—	—	—	—	—	—	—
R.50	<i>M. littoralis</i> .	Dicksons Rd.	—	—	N.D.	—	—	—	—	—	—	—	—
R.37	<i>R. conatus</i> .	Dicksons Rd.	—	—	N.D.	1000	300	—	—	—	—	—	—
R.39, R.49	<i>R. conatus</i> .	Dicksons Rd.	—	—	N.D.	—	—	—	—	—	—	—	—
R.44, R.51	<i>R. conatus</i> .	Bellenden Ker.	—	—	N.D.	—	—	—	—	—	—	—	—
R.40	<i>R. conatus</i> .	Dicksons Rd.	+	+	+	3000	100	—	—	—	—	—	—
R.41	<i>R. conatus</i> .	Dicksons Rd.	+	+	+	100	300	—	—	—	—	—	—
R.42	<i>R. conatus</i> .	Dicksons Rd.	+	+	N.D.	100	—	—	—	—	—	—	—
R.43	<i>R. conatus</i> .	Dicksons Rd.	+	+	N.D.	300	30	—	—	—	—	—	—
R.45	<i>R. conatus</i> .	Dicksons Rd.	+	+	+	300	1000	—	—	—	—	—	—
R.46	<i>R. conatus</i> .	Dicksons Rd.	+	+	N.D.	300	100	—	—	—	—	—	—
R.48	<i>R. conatus</i> .	Dicksons Rd.	+	+	N.D.	—	—	—	—	—	—	—	—
R.47	<i>R. conatus</i> .	Bellenden Ker.	+	+	+	1000	30	—	—	—	—	—	—
R.52	<i>R. conatus</i> .	Bucklands Rd.	+	+	+	300	300	—	—	—	—	—	—
R.53	<i>R. conatus</i> .	Bucklands Rd.	+	+	+	300	100	—	—	—	—	—	—
R.56	<i>R. conatus</i> .	Bucklands Rd.	+	+	—	3000	100	—	—	—	—	—	—
B.24	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	3000	1000	—	—	—	—	—	—
B.30	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	10000	1000	—	—	—	—	—	—
B.41	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	3000	100	—	—	—	—	—	—
B.50	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	3000	300	—	—	—	—	—	—
B.51	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	1000	100	—	—	—	—	—	—
B.54	<i>I. obesulus</i> .	Bucklands Rd.	—	—	N.D.	—	—	300	—	—	—	30	100
B.55	<i>I. obesulus</i> .	Boulders Rd.	—	—	N.D.	3000	1000	—	100	300	—	—	—
B.62	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	—	—	—	—	—	1000	3000	10000
B.22	<i>I. obesulus</i> .	Bucklands Rd.	—	—	N.D.	10	—	—	—	—	—	—	—
B.42	<i>I. obesulus</i> .	Mirriwinni.	—	—	N.D.	30	—	30	—	—	—	—	—
B.43	<i>I. obesulus</i> .	Bucklands Rd.	—	—	N.D.	30	—	—	—	—	—	—	—
B.40	<i>I. obesulus</i> .	Bucklands Rd.	—	—	N.D.	—	30	—	—	—	—	—	—
20 bandicoots	<i>I. obesulus</i> .	Babinda area.	—	—	N.D.	—	—	—	—	—	—	—	—

guinea-pigs, but avirulent strains of pathogenic leptospiræ have been recorded previously; thus Zuelzer (1935) isolated strains of *L. icterohæmorrhagiae* that were not virulent to guinea-pigs from rats in Denmark. Thus, 12 of the 16 specimens of *R. conatus* had been infected with a member of the *australis* A serogroup, and nine were urinary carriers. No evidence was found of infection with any other serogroup.

The *Melomys* and the two specimens of *R. rattus* gave negative results to all tests, except for low titres (30) of doubtful significance, against *icterohæmorrhagiae* and "Esposito", in the serum of one *R. rattus*.

Leptospiræ could not be demonstrated in the kidneys of the bandicoots, but 12 had antibodies in their sera. Six had high titres against *australis* A (1000 to 10,000) and "Esposito" (100 to 1000). Five of these came from farms at Bucklands Road or Mirriwinni, and one came from Boulders Road, Babinda. The last-mentioned also had antibodies against *icterohæmorrhagiae* and *canicola*. Two bandicoots had antibodies against the *hebdomadis* group. One (from Bucklands Road) had titres of 1000, 3000 and 10,000 against *medanensis*, "Kremastos" and "Szwajizak"; the other had titres of 100 against "Szwajizak" and 30 against "Kremastos". In addition, this bandicoot had a titre of 300 against *australis* B. One bandicoot had complement-fixing antibodies against *Rickettsia mooseri* to a titre of 32.

The canefield on Dicksons Road, Babinda, where the patient was infected with "Esposito" in July, was closely examined in September during a comparatively dry period. A strain of leptospiræ was isolated from cane trash taken at the base of a rat nest. The trash was taken to the Field Station and flooded with distilled water, and a guinea-pig immersed in it for one and a half hours after its abdomen had been scarified. The pig died on the thirteenth day with leptospirosis, and the strain isolated from it was identified as belonging to the "Esposito" serotype (Smith and Brown, 1955). Similar experiments with the soil underneath the trash, and with two pools of surface water in the same field, did not produce a febrile

reaction or an antibody response in the guinea-pigs immersed.

The conditions under which cutters had to work on this farm are illustrated in Figures III, IV and V. Figure III shows the depth of water found after a period of rain; Figure IV shows "lodged" cane; that is, cane which has fallen and provides rat harbourage. Figure V is a photograph of swamp adjoining the farm.

The animal work supports the contention that *R. conatus* is the vector of *australis* A in canefields in North Queensland (Sawers, 1938). It was the commonest rat caught, and more than half of those examined were excreting leptospiræ. The animal caught most often, the marsupial *Isodon obesulus*, was not found to excrete leptospiræ. The serological evidence suggests that the bandicoot can become infected; it is of interest that two had evidence of *hebdomadis* group infection. The area in which these two animals were caught produced no human cases of infection with that serogroup at that particular time, and produced only one such case over a period of four years from July, 1951.

Discussion.

The dates of onset of illness in the patients in this series show a close relation to rainfall. Almost all the patients were infected in what were correctly predicted as danger periods. Low-lying areas along the rivers provided a large proportion of cases. To this extent the present study does no more than confirm observations made by the Well's Disease Inspectors over many years.

There were three instances in which two or three patients were infected at the same time; it seems reasonable to assume that they were infected in fields of greater than usual infectivity. Three were infected while cutting green cane for planting. As plant-cane must be green, and as planting cannot be delayed far into the crushing season, these men were taking a calculated risk, and prevention of such cases would be difficult. Two were infected in cane that was not obviously infected and that was well burnt, but where heavy rain fell after burning. Another

pair were infected in similar circumstances, but after an accidental fire.

These patients can be grouped with the 11 patients infected in "dangerous" cane that had been burnt under a "Health Order". Several of these patients gave a similar history of rain falling after the cane had been burnt. In all, 27 patients were infected in cane that had been burnt to the satisfaction of the health inspector. Obviously, either burning cane does not kill all leptospirae in surface



FIGURE III.

The cane field from which the "Esposito" strain was isolated, showing the depth of water following rain.

pools, on the ground and on the cane, or some factors must operate that contaminate the environment between burning and cutting. There is some evidence in each direction.

Thus Sawers (1938) studied a cane fire and considered the heat generated, while sufficient to kill leptospirae on



FIGURE IV.

"Lodged" cane providing rat harbourage.

the cane and in the surface layers of the soil, to be of such short duration that it would not appreciably penetrate either soil or water. Leptospirae in deeper soil layers might therefore be unharmed by the fire, and might infect pools if the ground subsequently became waterlogged.

Smith and Self (1955) demonstrated that leptospirae survived for up to six weeks in soil taken from a cane field in North Queensland during the dry season and containing no added moisture, and were infective for guinea-pigs at

the end of that time. Their experiments simulated conditions on the cane fields. The soil was infected by culture or by the urine of infected rats, it was allowed to stand without the addition of further moisture for varying periods, and it was then flooded with water (representing a tropical downpour) and tested for infectivity by guinea-pig subcutaneous flow methods.

There is also the possibility that surface pools of water will be reinfected directly by animals. Rats will eat burnt cane, and the authors have trapped animals on the edge of a field of burnt cane. Whatever the relation of these findings to natural conditions, it must be accepted that burning the cane does not render subsequent cutting safe. The preventive methods would be more effective if the inspectors were to be given the power to suspend cutting in waterlogged fields, even after the cane had been burnt.

A different and more difficult problem is represented by the 24 patients infected on farms that had been inspected and considered safe. It is obvious that, where the rat population has a high proportion of urinary carriers, human infections may occur without heavy rat infestation.



FIGURE V.

Swamp adjoining the cane field shown in Figures III and IV.

It is doubtful whether any cane field is free of rats, and the strict insistence on effective burns in all cane cut in wet weather could well create a situation in which no cane at all could be cut. The prevention of leptospirosis on farms where the evidence of rat damage is insufficient to bring them within the terms of the present regulations would seem to depend on the personal hygiene of the cutter himself. The cane cutter, covered by workers' compensation insurance and well aware that modern antibiotic treatment of leptospirosis is effective, is not anxious to lose time and wages. He is often therefore the least amenable to public health supervision of all the parties concerned. Further investigations on the value of protective footwear may warrant an effort to compel cutters to wear adequate boots.

Gordon (1951) wrote:

Just why an "epidemic" of Weil's disease occurs is difficult to say. Low-lying cane fields that do not dry out are one necessity, unusually heavy rain just before or during the crushing is another; whether there is another connected with the density of the rat population and the amount of leptospirosis among this population is not known. There must be some third unknown entity that has not yet been clearly demonstrated.

The factors that caused this outbreak at Babinda are not clear. Rainfall and the influx of new cutters were features common to other mill areas that had no increase in leptospirosis incidence. It seems that the main factor was a high incidence of leptospirosis among the *R. conatus*

population, and perhaps an increase in the numbers of this rat. Infection of man is incidental in the natural history of the leptospira. The explanation of outbreaks may well be found in the unstable equilibria between the leptospiræ and their natural hosts, and between the hosts and their environment.

Summary.

1. Forty-two cases of leptospirosis were recognized in the Babinda area between July and November, 1954; there was no corresponding increase in incidence in the Tully, Innisfail, Gordonvale or Mossman areas.

2. The infecting serotype was *australis* A or the closely related "Esposito" in 35, *canicola* in three, and "Robinson", *hyos* and "Kremastos" in one each.

3. Thirty-eight patients were cane workers infected in the canefields; 34 of these patients were infected with the *australis* A serogroup.

4. The geographical distribution of cases followed the rivers; there was a close correlation between the time incidence and the rainfall. Six farms produced two or more cases.

5. Twenty-seven patients were infected in cane that had been burnt to the satisfaction of the health inspector; in 11 cases the cane had been considered dangerous, and its burning and cutting had been closely supervised.

6. Fifty-two animals caught in or near canefields in the Babinda area were investigated. Eleven of 16 specimens of *R. conatus* had antibodies against *australis* A, and nine were urinary carriers. The strain was isolated from eight, and identified as *australis* A serotype. No leptospiræ were demonstrated in kidneys of 32 specimens of *Isoodon obesulus*, but 12 had agglutinins against leptospiræ—in high titre against the *australis* A serogroup in six, in low titre against that group in four; two bandicoots had agglutinins against the *hebdomadis* group.

7. The public health aspects of the outbreak are interpreted to show that infected cane may not be rendered safe to cut by burning. The difficulty of preventing all cases of leptospirosis is stressed.

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LEPTOSPIROSIS IN NORTH QUEENSLAND: AN EPIDEMIOLOGICAL COMPARISON BETWEEN THE VARIOUS LEPTOSPIRAL SEROTYPES.¹

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At least 13 serotypes of leptospiræ cause human infection in North Queensland (Smith *et alii*, 1954; Smith and Brown, 1955). The general epidemiological features of leptospirosis in this region have been reviewed by Derrick *et alii* (1954); the present study analyses the behaviour of individual serotypes. For this purpose 208 cases caused by 11 types were available, diagnosed during the first three years' work (1951 to 1954) of the Innisfail Field Station of the Queensland Institute of Medical Research. A further 11 cases in which the infecting type was not precisely determined are included for completeness.

The two commonest types found were *australis* B (26%) and *australis* A (22%). They were followed by "Kremastos" (10%), "Robinson" (8%), "Celledoni" (7%), and *hyos* (7%).

The types will be compared with one another in relation to locality, occupation, rainfall and season. Interrelations of these variables will necessarily be touched on.

Relation to Locality.

The striking variation in the incidence of leptospirosis from place to place in North Queensland has already been recorded. There is also considerable variation in the geographical distribution of infection due to the individual types.

In Table I the cases are analysed according to locality and type. Most came from the shires of Mulgrave, Johnstone and Douglas. For the purpose of this paper, Division 3 of Mulgrave, which surrounds Babinda, and the combined Divisions 1, 2 and 4 of that shire, which include the township of Gordonvale and the outskirts of the city of Cairns, will be regarded as two separate shires. The main centre of population of Johnstone is at Innisfail (7000) and that of Douglas at Mossman.

In Table II the rates of infection with the types in proportion to the population are shown for the shires from which most cases came. The rates cover the whole three-year period. The shire of Cook has a sparse population scattered over an immense area; its seven cases all came from the south-east corner, and the present information does not permit an estimate of a rate for the shire. Only seven cases are reported from Cardwell shire; it is uncertain whether this apparent infrequency is real.

By far the highest rate of leptospirosis in general was found in Division 3 of Mulgrave shire. It was over four times as high as in Douglas, Mulgrave Divisions 1, 2 and 4, and Johnstone taken together. The differences from these shires were highly significant, being 3.8, 6.4 and 6.0 times the standard errors. The rate in Douglas was significantly higher than in Mulgrave 1, 2 and 4 (difference 2.9 times the standard error) or in Johnstone (difference 2.2 times the standard error). The excess in Johnstone over Mulgrave Divisions 1, 2 and 4 was not significant.

When the figures for the three years were analysed separately, it was found that in every year the rate for Mulgrave 3 was significantly higher than in Mulgrave 1, 2 and 4, or in Johnstone. It was always higher than in Douglas, but in only one of the three years was the excess significant.

In drawing conclusions from these figures it needs to be borne in mind that case finding was more complete in Johnstone and Mulgrave 3 than in the shires more remote from the Field Station. However, one can accept without question the considerable and consistent excess of the rate

¹ Read at a meeting of the Section of Tropical Medicine, Australasian Medical Congress (British Medical Association), Ninth Session, Sydney, August 20 to 27, 1955.

TABLE I.
Distribution of 219 Cases of Leptospirosis According to Infecting Type of Leptospira and to Shire of Origin.

Shire.	<i>ictero-haemorrhagica</i> .	<i>canicola</i> .	<i>australis A.</i>	<i>australis B.</i>	"Robin-son."	<i>pomona</i> .	<i>hyos</i> .	<i>medanensis</i> .	"Kre-mastos."	"Szwajzak."	"Cel-ledoni."	Undeter-mined.	Total.
Cook	—	1	—	3	—	—	—	—	—	—	2	1	7
Douglas	1	4	1	5	—	—	3	4	1	1	2	3	25
Mareeba	—	—	—	1	—	—	1	—	—	—	—	—	2
Cairns City	—	—	—	—	—	—	—	—	—	—	1	—	1
Mulgrave 1, 2, 4	3	3	0	10	—	—	4	—	1	—	—	2	32
Mulgrave 3	1	3	29	11	1	—	5	—	3	4	4	1	62
Johnstone	—	1	7	24	10	2	1	—	15	4	4	1	69
Cardwell	—	—	—	1	5	—	—	—	—	—	—	—	7
Unallotted to shire	—	—	1	3	1	1	1	—	2	—	2	3	14
Totals	5 (2%)	12 (5%)	48 (22%)	58 (26%)	17 (8%)	3 (1%)	15 (7%)	4 (2%)	22 (10%)	9 (4%)	15 (7%)	11 (5%)	219

TABLE II.
Infection Rate per 10,000 Population Analysed According to Leptospiral Type and Shire.

Shire and Population.	<i>ictero-haemorrhagica</i> .	<i>canicola</i> .	<i>australis A.</i>	<i>australis B.</i>	"Robin-son."	<i>pomona</i> .	<i>hyos</i> .	<i>medanensis</i> .	"Kre-mastos."	"Szwajzak."	"Cel-ledoni."	Undeter-mined.	Total.
Douglas, 2000	4	15	4	19	—	—	12	15	4	4	8	12	96
Mulgrave 1, 2, 4, 8470	4	4	11	12	—	—	5	—	1	—	—	2	38
Mulgrave 3, 2750	4	11	105	40	4	—	13	—	11	15	15	4	225
Johnstone, 13,630	—	1	5	18	7	1	1	—	11	3	3	1	51

TABLE III.
Relative Frequency in the Shires of Infection Due to Each Leptospiral Type. (Percentages).

Shire.	<i>ictero-haemorrhagica</i> .	<i>canicola</i> .	<i>australis A.</i>	<i>australis B.</i>	"Robin-son."	<i>pomona</i> .	<i>hyos</i> .	<i>medanensis</i> .	"Kre-mastos."	"Szwajzak."	"Cel-ledoni."	Undeter-mined.
Douglas	4	16	4	20	—	—	12	16	4	4	8	12
Mulgrave 1, 2, 4	9	9	28	31	—	—	13	—	3	—	—	6
Mulgrave 3	2	5	47	13	2	—	8	—	5	6	6	2
Johnstone	—	1	10	35	14	3	1	—	22	6	6	1

of infection in Mulgrave 3 over Johnstone and the excess in Douglas over Johnstone.

Table III shows the relative frequencies of the types within each shire.

Leptospira Australis A.

In the analyses of leptospiral types in relation to shires, the outstanding feature was the concentration of *australis A* infections in Mulgrave 3. This is brought out in Table IV. There were more infections with this type in Mulgrave 3 than in all the other shires combined, and this was true for each of the three years of the survey. Its prevalence in this locality is further emphasized when the population is taken into account. The rate of infection with *australis A* was 15 times higher there than in the other shires taken together, and the excess over each of the other shires was significant in each individual year (difference 2.2 to 5.0 times the standard error). This one type alone was responsible for 57% of the excess in Mulgrave 3 in the rate of leptospirosis in general.

Within Mulgrave 3, *australis A* was, in each year, the most frequent type to cause infection; in the period as a whole it caused almost as much as all the other types together. When its relative frequency in Mulgrave 3 was compared with that in other shires, it was seen to be significantly higher than in Douglas (difference 5.7 times the standard error) or in Johnstone (difference 5.0 times the standard error). However, the excess over Mulgrave 1, 2 and 4 did not reach the level of significance (difference 1.8 times the standard error).

The second highest incidence of *australis A* infection was found in Mulgrave 1, 2 and 4—second in number of cases, in rate per population and in relative frequency

in the shire. The rate per population was not significantly higher than in Douglas or Johnstone, but the greater relative frequency in Mulgrave 1, 2 and 4 over Douglas and over Johnstone reached significance (difference 2.7 and 2.1 times the standard error).

L. Australis B.

Australis B, the commonest infecting type, was well distributed throughout the whole area, with minor variations in density from place to place. Differences that reached statistical significance were the higher rate per population in Mulgrave 3 over that in Mulgrave 1, 2 and 4 (difference 2.2 times the standard error), and the higher relative frequency in Johnstone over Mulgrave 3 (difference 2.3 times the standard error).

Australis B was a cause of urban infections in Innisfail. All four cases of leptospirosis that had their origin in the residential area of the town were caused by this type, as well as at least five of the seven that arose in the countryside within two and a half miles of the Post Office. Another may have been due to it—the serum developed agglutinins equally to it and to *canicola*. The eleventh case was caused by "Kremastos". Five of the 11 patients were children who had been playing on muddy ground or in water. One man had cleaned a drain at his residence, another a duck run; both had noted the presence of rats. Two worked in the yard of a sugar mill, and one on a cane farm. A plumber had laid a water-main through a cane field.

"Kremastos."

"Kremastos", which came third in general frequency, was the second commonest type found in Johnstone, where

it was widely distributed (Figure 1). Its relative frequency in Johnstone was significantly higher than in each of the other shires (difference 2.8 to 3.2 times the standard error). It was represented only by single cases in Douglas and Mulgrave 1, 2 and 4.

L. hyos (Syn. *Mitis Johnsoni*).

Hyos was well distributed. The highest infection rate was found in Mulgrave 3 and the lowest in Johnstone; the difference is significant (difference 2.14 times the standard error). The other two shires occupied intermediate positions. Johnstone also showed the lowest relative frequency, but its differences in this respect from the other shires were not, or only doubtfully, significant.

TABLE IV.
Incidence of *Australis A* Infection in Shires.

Shire.	Number of Cases.	Rate per 10,000 of Population.	As Percentage of Total Cases in each Shire.
Douglas	1	4	4
Mulgrave 1, 2, 4	9	11	28
Mulgrave 3	29	105	47
Johnstone	7	5	10

Hyos was responsible for the infection of three of six patients who apparently became infected in Babinda township. Two were children who had been swimming in Babinda Creek; the other was a housewife who was probably infected in a swampy section of her yard. One can only guess at the source of these infections. No domestic pigs are kept in Babinda, but wild pigs abound in the nearby rain forest and, if infected, could contaminate watercourses. (Wild pigs are common also in many other places in North Queensland.) The other three infections in Babinda were due to *canicola* (two) and "Celledoni". Apart from these six urban infections, many cases of leptospirosis of varied types arose in nearby canefields.

"Robinson."

All but two of the 17 "Robinson" infections arose in Johnstone or Cardwell shires—that is, in the southern part of the leptospirosis area (Figure 1).

L. Medanensis.

In contradistinction to "Robinson", infections with *medanensis* were found only in the northern part—in Douglas shire. The four patients were the two cane-farmers mentioned in earlier reports, a labourer on a pineapple and banana farm, and an electrician who spent his week-ends fishing.

"Celledoni" and *L. Canicola*.

"Celledoni" and *canicola*, although comparatively infrequent, were widely distributed through the leptospirosis area. "Celledoni" was responsible for three of the seven cases of leptospirosis which occurred at Boogan (six miles south of Innisfail), and *canicola* for three of the seven cases in the small community at Daintree (in Douglas shire).

Doherty *et alii* (1956) have taken advantage of the intense localization of *australis A* in certain canefields in Mulgrave 3 for a study of the ecology of this type. Similarly, the environs of Innisfail offer a favourable and convenient site for a study of *australis B*; "Kremastos" may advantageously be investigated in Johnstone, "Robinson" in Johnstone and Cardwell, *medanensis* in Douglas, and perhaps "Celledoni" at Boogan.

Relation to Occupation.

Personnel engaged in canefields—as farmers, cutters or labourers—provided 55% of the cases of leptospirosis in this series. The percentages in the individual shires were as follows: Mulgrave 3, 79; Johnstone, 65; Mulgrave 1, 2 and 4, 47; Douglas, 28.

The distribution of the leptospiral types according to occupation in canefields or elsewhere is given in Table V; but it should be noted that, while occupation in a canefield is strong evidence that infection was acquired there, it does not conclusively prove it (canefield workers may also



FIGURE 1.

Map illustrating the distribution of cases of "Kremastos" (K) and "Robinson" (R) leptospirosis. The majority of each arose in Johnstone shire.

be swimmers); nor does classification in some other occupational group exclude infection in canefield (as, for instance, with school children living on cane farms).

All eleven types were represented among the canefield cases, but *australis A* had a special association. Forty of the 48 *australis A* patients were occupied in canefields and the other eight had been in or near them; three worked at the Babinda sugar mill and one of these had assisted in a canefield at the week-end; a carpenter lived near cane farms and a schoolboy on one; the other three had been in the vicinity of canefields—shooting, timber-getting or camping. In regard to canefield work, *australis A* was

very significantly different from the other types taken together ($\chi^2 = 18.8$, $P < 0.001$).

While all *australis A* infections had some association with canefields, the converse did not hold. Only a third of canefield infections were caused by *australis A*, although it was the commonest type found in them. The proportion varied from shire to shire (Table VI). It was highest in Mulgrave 3. The excess in that shire over Johnstone was a very real one ($\chi^2 = 11.6$, $P < 0.001$), but the excess over the other two shires was not significant.

TABLE V.
Relation to Leptospiral Type to Occupation in Canefields.

Type of Leptospira.	Canefield Cases.	Non-Canefield Cases.	Total.
<i>tetrahymorrhagiae</i>	1	4	5
<i>canicola</i>	3	9	12
<i>australis A</i>	40	8	48
<i>australis B</i>	26	32	58
"Robinson"	8	9	17
<i>pomona</i>	3	—	3
<i>hyos</i>	6	9	15
<i>medanensis</i>	2	2	4
"Kremastor"	12	10	22
"Szwajizak"	8	1	9
"Celledoni"	7	8	15
Undetermined	4	7	11
Total	120	99	219

Two other types differed significantly ($P < 0.05$) from the rest on the figures in Table V—*canicola* by its trend away from canefields and "Szwajizak" by its high association with them. The one "Szwajizak" patient (a laundryman) who was not occupied on a cane farm lived on one.

TABLE VI.
Proportion of Canefield Leptospirosis due to *Australis A*.

Shire.	Number of Canefield Cases.	Cases Due to <i>australis A</i> .	
		Number.	Percentage.
Douglas	7	1	—
Mulgrave 1, 2, 4	15	6	—
Mulgrave 3	49	25	51
Johnstone	45	7	16
Other	4	1	—
Total	120	40	33

The special association of *australis A* infections with canefields is to be linked with the prevalence of its principal carrier, *Rattus conatus* Thomas, in canefields. The less specific association with canefields of the other types, except perhaps "Szwajizak", indicates that their carriers are to be sought not only there, but also in other environments. In this series, some infections with the following types arose at least 15 miles from a canefield—*canicola*, *australis B*, "Robinson" and "Celledoni".

Relation to Rainfall.

The incidence of cases was studied in relation to the amount of rain which fell at the probable time of infection. The rainfall figure adopted for each case was the highest total over any seven consecutive days within four to nineteen days before the onset. (Schüffner observed the incubation period to range from four to nineteen days.) The use of a moving seven-day period may give a bias towards wetness, but is thought to provide a more accurate index of the relation of cases to wetness than if a fixed period at the middle of the incubation range had been chosen and the possible influence of heavy falls of rain at

either end of the range excluded. Any bias does not interfere with comparisons of locality or serotype.

The rainfall records at Innisfail were used for cases in Johnstone shire, those at Babinda for Mulgrave 3, Meringa for Mulgrave 1 and 2, Cairns for Cairns city and Mulgrave 4, and Tully for Cardwell. For Douglas shire, Mossman records were used except for seven cases at Daintree, for which Daintree records were used.

The average weekly rainfall at Innisfail and Babinda is about three inches (more exactly, 2.75 and 3.12 inches respectively), and the three-inch level is convenient for the demarcation of drier and wetter weeks. Only 58 of 197 patients (29%) were probably infected during weeks with less than three inches of rain. The proportion varied from 14% in Johnstone to 41% in Douglas. The infrequency of infection in drier weeks is emphasized by the fact that such weeks occurred much more often than wetter weeks; they comprised between 72% (as at Tully) and 86% (as at Meringa) of the total weeks.

Another index of the relation to rainfall may be obtained by grading the rainfall in multiples of three inches, and comparing the incidence of cases with that of weeks for each grade. The relation is almost a linear one (Figure II); the correlation coefficient is 0.94 ($P < 0.01$). Inceas-

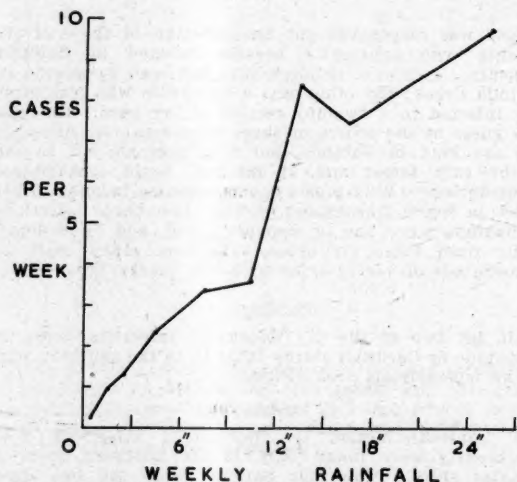


FIGURE II.

The risk of contracting leptospirosis increases with rainfall in almost direct proportion.

ingly wet weather (at a particular place) implies a steady increase in the risk of leptospiral infection.

Table VII sets out the relation to rainfall of infection with the individual serotypes. With every type the majority of cases was associated with more than average wetness (except that the four cases of *medanensis* were evenly divided). The only type differing significantly from the others was "Robinson" ($\chi^2 = 5.8$, $P < 0.02$); no case at all of "Robinson" infection arose in drier weather.

For a reason to be explained later, special attention is drawn to the fact that *australis A* behaved like other types in relation to wetness. The value of χ^2 for the comparison of *australis A* with other types taken together is 0.29, for which $P > 0.5$. (This value of χ^2 has not been corrected for continuity, in order to bring out any difference that might exist.)

The median weekly rainfall at Innisfail and Babinda is approximately one inch. Only 21 of the 197 cases arose in weeks with less rain than this. The leptospiral types were widely represented in these dry weather cases—*australis A* (7), *australis B* (5), *canicola* (1), *hyos* (2), *medanensis*

(2), "Kremastos" (2), "Celledoni" (1), undetermined (1). No type showed a significant difference from the combined others in its distribution between wet and dry weather, when these were divided at the 1.00 inch level of rainfall. *Australis A* again behaved like the other types (χ^2 , uncorrected, = 1.3, $P > 0.2$). The suggestion above that "Robinson" might be different was not confirmed by the analysis at the 1.00 inch level.

With at least 11 of the 21 dry weather cases there was an obvious association with surface water. Six subjects

TABLE VII.

Association of Rainfall with Infection Due to Individual Leptospiral Serotypes.

Serotype.	Weekly Rainfall (Inches) and Number of Cases.		Total Cases.
	0 to 2.99.	3.00 and Over.	
<i>icterohaemorrhagiae</i> ..	2	3	5
<i>canicola</i> ..	3	8	11
<i>australis A</i> ..	15	31	46
<i>australis B</i> ..	20	32	52
"Robinson" ..	—	16	16
<i>pomona</i> ..	—	2	2
<i>hyos</i> ..	5	9	14
<i>medanensis</i> ..	2	2	4
"Kremastos" ..	5	15	20
"Szwajizak" ..	1	8	9
"Celledoni" ..	2	9	11
Undetermined ..	3	4	7
Total ..	58	139	197

had been swimming, one had been shooting ducks in a swamp, two had cleaned out drains, and two were bridge labourers.

As far as the evidence goes, it appears that the leptospiral types behaved similarly in relation to the wetness of the environment.

Relation to Season.

Seasonal influence has been analysed by comparing the incidence in the first and second halves of the year. The most relevant feature of the first half is that it includes the wet season, which usually runs from January to April; in the second half there is increased activity in the canefields, as cane cutting begins in May or June and continues until about December.

Of the 219 cases, twice as many occurred in the first half of the year as in the second (Table VIII)—a fact which may reasonably be related to the influence of the wet season. But in Mulgrave 3 the majority of cases occurred in the drier half of the year, and in this respect Mulgrave 3 differed considerably from the other shires. Comparison with Johnstone, based on the figures in the last two columns of Table VIII, gives $\chi^2 = 23.0$, $P < 0.001$.

The striking seasonal difference between Mulgrave 3 and Johnstone is further demonstrated in Figure III. In

Johnstone, 70% of the cases occurred in the four wet months. In Mulgrave 3 there was a peak in the wet season, but a greater one in the period from August to October. (The monthly distribution in Douglas and Mulgrave 1, 2 and 4 resembled that in Johnstone.) As the rural population of Mulgrave 3 is only about two-fifths that of Johnstone, the infection rate for Mulgrave 3 on this basis would become of similar magnitude to that of Johnstone in the wet season, but soar far above it in the dry. The unusual distribution in Mulgrave 3 is, therefore, not due to a lack of cases in the wet season, but to an excessive prevalence in the drier months. This prevalence is clearly related to work in canefields; 33 of the 38 cases that occurred in Mulgrave 3 from July to December (as well as all 13 Johnstone cases) were among canefield workers.

All shires reflected the influence of the increased cane-field activity in the second half of the year (Table VIII); 47% of canefield cases arose then, compared with 14% of non-canefield cases. Nevertheless, except in Mulgrave 3, most canefield infections arose in the wetter period, in spite of the fewer at risk at that time.

The risk of contracting leptospirosis in the second half of the year to other than canefield workers appears to be quite low. There were only 14 such cases, or 6% of the series. The leptospiral types represented were: "Celledoni", four; *australis A*, three (as mentioned before, these three patients had some association with canefields, although not classed as canefield workers); *hyos*, three; *australis B*, one; "Kremastos", one; undetermined, two. The proportion of "Celledoni" cases in this group seems high.

In Table IX the seasonal distribution is analysed in relation to the individual serotypes. Because of the different distribution in Mulgrave 3, the cases that arose there are analysed separately from the others.

Most interest attaches to *australis A*. Its distribution in Mulgrave 3 is significantly different from that in the other shires ($\chi^2 = 5.1$, $P < 0.05$); but within Mulgrave 3, and within the other shires, its distribution resembles that of the other types ($\chi^2 = 1.4$ and 1.0 , $P > 0.20$). The totals for the other types in Mulgrave 3 are too small for satisfactory comparison, but it may be noted that all "Szwajizak" cases, both in Mulgrave 3 and elsewhere, occurred in the first half of the year. In the other shires there is no evidence that any type behaved differently from the rest. χ^2 for this section of Table IX = 10.1, $n = 11$, $P > 0.5$.

Conclusions.

Australis A Infections.

It is desirable now to bring together the following points that have been noted earlier: (i) By far the highest rate of leptospirosis in general was found in Mulgrave 3. (ii) The greatest contribution to the excess rate in Mulgrave 3 was provided by *australis A* infections. (iii) All *australis A* infections arose in or near canefields.

It may further be established (by comparing the numbers of cases and cane-cutters) that the risk to cane-

TABLE VIII.

Seasonal Distribution in Relation to Shire and Occupation in Canefields.

Shire.	Canefield Cases.		Non-Canefield Cases.		All Cases.	
	January to June.	July to December.	January to June.	July to December.	January to June.	July to December.
Douglas ..	4	3	14	4	18	7
Mulgrave 1, 2, 4 ..	11	4	17	—	28	4
Mulgrave 3 ..	16	33	8	5	24	38
Johnstone ..	32	13	24	—	56	13
Other ..	1	3	22	5	23	8
Total ..	64	56	85	14	149	70

field workers of contracting *australis A* infection was about nine times as high in Mulgrave 3 as elsewhere. What is the reason for this considerable difference?

Certain cane farms in Mulgrave 3 where cases have repeatedly arisen are flat and low-lying, and have depressions in which water lies (Figure IV). There is a high

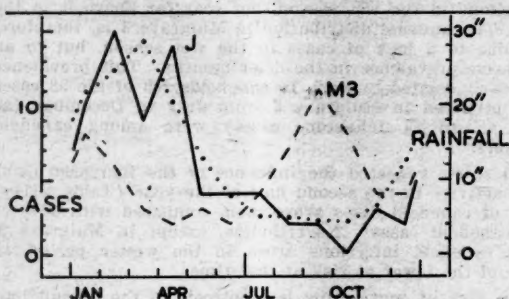


FIGURE III.

Contrasting monthly incidence of leptospirosis in Johnstone (continuous line) and Mulgrave 3 (broken line). The dotted line represents the mean monthly rainfall at Innisfail and Babinda. The incidence in Johnstone corresponds closely to the rainfall. In Mulgrave 3 the highest incidence is in the drier, cane-cutting season.

run-off from nearby hills. The ground is liable to remain moist, and readily becomes saturated, even during the drier months, by the heavy showers that fall from time to time. The risk on such farms is well recognized, and it is probable that their proportion is rather higher in Mulgrave 3 than in other shires. This would be a plausible explanation for a higher rate there of leptospirosis in

TABLE IX.
Seasonal Distribution in Relation to Leptospiral Serotype.

Serotype.	Cases in Mulgrave 3.		Cases in Other Shires.		Total Cases.
	January to June.	July to December.	January to June.	July to December.	
<i>icterohaemorrhagiae</i>	—	1	4	—	5
<i>canicola</i> ..	3	—	8	1	12
<i>australis A</i> ..	9	20	13	6	48
<i>australis B</i> ..	3	8	39	8	58
"Robinson" ..	1	—	13	3	17
<i>gompsoni</i> ..	2	—	3	—	5
<i>hyos</i> ..	—	3	7	3	13
<i>medanensis</i> ..	—	—	2	2	4
"Kremastoc" ..	2	1	16	3	22
"Szwajlsak" ..	4	—	5	—	9
"Colledoni" ..	—	4	7	4	15
Undetermined	—	1	8	2	11
Total ..	24	38	125	32	219

general. However, as *australis A* behaves to wetness in the same way as other leptospiral types, variation in wetness cannot explain the disproportionate excess of *australis A* cases in Mulgrave 3.

In this respect, recent observations by Doherty *et alii* (1956), which confirm and extend earlier work, are illuminating. They found that a high proportion of *R. conatus* captured in Mulgrave 3 canefields were carriers of *australis A*, and concluded that this (with perhaps an increased rat population) was the likely explanation of the high local incidence of leptospirosis in canefield workers. Their conclusion seems well grounded.

The special association of *australis A*, *R. conatus* and canefields defines clearly one section of the leptospirosis

problem in North Queensland. On present figures this section comprises one-third of canefield infections and about one-fifth of all cases. A campaign against *R. conatus* would be a logical preventive measure to adopt in affected canefields in Mulgrave 3 and, indeed, in any North Queensland canefield in which *australis A* infections occur. How

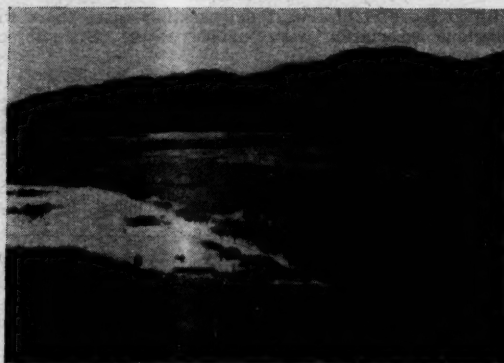


FIGURE IV.

Water lying beside a canefield in Mulgrave 3. Cases of leptospirosis arose on this and adjoining farms.

much such a campaign would control canefield infections due to other types is, without more knowledge of carrier-hosts, a matter of speculation.

Recent studies have much widened our understanding of the causative types and geographical and occupational range of North Queensland leptospirosis, but the original concept of it as a disease of canefields, transmitted by canefield rats, especially *R. conatus*, still holds firmly for at least *australis A* infections.

Leptospirosis Other Than That Caused by *Australis A*.

Does the higher incidence of leptospirosis in Mulgrave 3 than elsewhere depend solely on the higher incidence of *australis A* infections?

General differences, if any, are of much less magnitude than that depending on *australis A*, and comparisons relating to them must largely be confined to those between Mulgrave 3 and Johnstone, because of the fewer cases and the less complete recording in other shires. The variation in recording was of little consequence in the consideration of the major differences with *australis A*.

The number of canefield and non-canefield cases in the two shires and their rates of infection with respect to the population are noted in Table X. For non-canefield infec-

TABLE X.
Leptospirosis Other than That Caused by *Australis A* Analysed according to Shire and Occupation.

Shire.	Canefield Cases.		Non-Canefield Cases.		Total Cases.	
	Number.	Rate per 10,000 Population.	Number.	Rate per 10,000 Population.	Number.	Rate per 10,000 Population.
Mulgrave 3	24	87	9	33	33	120
Johnstone	38	28	24	18	62	45

tions the rates are not significantly different; they would be almost identical if the rate in Johnstone was calculated on the rural instead of the total population.

For canefield infections the rate per population is significantly greater in Mulgrave 3 (difference 3.2 times the standard error). A more pertinent comparison would

be one based on the numbers at risk in the cane-fields of each shire. These numbers are not known, but an index of this is provided by the 396 cane-cutters in Mulgrave 3 and the 1020 in Johnstone. Calculated on this basis, the risk of contracting leptospirosis other than that caused by *australis A* appears to be 1.6 times greater for a cane-field worker in Mulgrave 3 than for one in Johnstone. However, the difference does not quite reach significance (difference 1.92 times the standard error).

As regards type variation between Mulgrave 3 and Johnstone, the rate per population of *hyos* infections was significantly higher in Mulgrave 3, and the relative frequencies of *australis B*, "Kremastos" and "Robinson" were significantly higher in Johnstone.

The higher rate of infection per population in Douglas over Johnstone depended mostly on non-cane-field infections and, as regards types, principally on *medanensis* and *canicola*.

Summary.

Eleven leptospiral serotypes were responsible for the 219 cases of leptospirosis which were recognized in North Queensland in the three years from 1951 to 1954. The commonest were *australis B* (26%) and *australis A* (22%).

There was considerable variation in the geographical distribution of the types. *Australis A* cases tended to concentrate in Division 3 of Mulgrave shire, and were largely responsible for the high general incidence there. *Australis B* infections were widely diffused throughout the area. "Kremastos" and "Robinson" were found mostly in the southern part, *medanensis* only in the northern.

The definition of areas where the incidence of individual types is comparatively high indicates where studies of their ecology would preferably be located.

The risk of contracting leptospirosis is directly related to rainfall, and in most areas the wet season provided the peak incidence. In these respects no difference was detected among the types.

Cane-field workers provided 55% of the cases. All *australis A* infections arose in or near cane-fields, and this type caused one-third of the cane-field cases. The special association of *L. australis A*, *Rattus conatus* and cane-fields defines clearly one section of the North Queensland leptospirosis problem.

Acknowledgements.

For the diagnosis of, and information about, patients not included in the previous study I am indebted to Dr. R. L. Doherty, Miss C. J. Ross and Miss M. L. Emanuel, of the Innisfail Field Station, to Dr. J. I. Tonge and his staff at the Laboratory of Microbiology and Pathology, Brisbane, to Dr. D. Gordon, and to Inspector J. M. Kennedy, Inspector D. Kennedy and Inspector N. Moore. Rainfall records were obtained through the courtesy of Mr. B. W. Newman, Deputy Director of the Meteorological Branch, and his staff, Mr. R. Laird, of Daintree, and Miss V. A. Bicks.

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Reports of Cases.

MEGALOCORNEA: REPORT OF A CASE.

By R. HEITZBERG,
Sydney.

MEGALOCORNEA is a term used to indicate a condition in which there is enlargement of the anterior segment of the eyeball with enlargement of the cornea as the most striking feature. Because of this latter feature, various names have been applied to the condition—namely, megalocornea, macrocornea, keratoglobus, *keratomegalia cornea globosa*, *cornea bulbosa*, *macrophthalmos*, *hydrophthalmos congenitus anterior*, *hydrops cameri anterior*, globular pellucid staphyloma, gigantophthalmos and enlarged eyeball.

The pathological features that characterize the disease are not limited to the cornea, but involve anterior chamber, iris, lens, and zonular fibres. Because of the involvement of tissues other than the cornea, the name anterior megalophthalmos as suggested by Vail (1931) has merit. When enlargement is gross, the term gigantophthalmos is suggested (Seefelder, 1914).



FIGURE 1.

The normal corneal diameter is 11 to 12.5 millimetres, with an average of 11.6 millimetres. When the horizontal diameter is greater than 12.5 millimetres, megalocornea exists. The ocular signs other than corneal enlargement are divided into major and minor (Vail, 1931). The major signs are hereditary or familial incidence, always bilateral, almost exclusively confined to the male sex and a complete absence of all evidence of glaucoma. The minor signs are deep anterior chamber, iridodonesis, atrophy of iris stroma and miosis due to atrophy of the dilator muscle, embryotoxon or gerontoxon, dislocated or tremulous lens frequently cataractous, Kruckenberg's spindle, presence of visible nerve fibres in the cornea, remains of a pupillary membrane and a sharply defined corneo-scleral margin. The condition is to be differentiated from hydrophthalmos or congenital glaucoma, in which there are raised intraocular tension, corneal opacities, and tears in Descemet's membrane. In addition in congenital glaucoma the condition is unilateral in 35% of cases, and the ratio of males to females is five to three. Familial occurrence is rare.

In a review of the literature, Vail (1931) found an average corneal diameter of 14.8 millimetres. There were 67 males and six females in the 73 cases reviewed. The youngest patient was aged three years and the oldest eighty-five years. Vail stated that cases of true megalocornea in females occurred when there was consanguinity in the parents.

Loss of vision, when it occurs, is due to the development of cataract which is of the complicated type. Removal of the cataract is more difficult and complications are more frequent than in the normal case. Vail operated on eight patients, all of whom were aged over thirty-five years.

Clinical Record.

A., a male infant, aged eight months, was examined at the Royal Alexandra Hospital for Children in May, 1955. The mother had noticed something wrong with the eyes for two months. The child was otherwise healthy.

Examination showed the child to have eyes with apparently useful vision. Both corneae were grossly enlarged and brilliant. There were no opacities and no tears in Descemet's membrane. The anterior chambers were very deep. The pupils were small, and both were occluded by what appeared to be lens capsule. The pupils failed to respond to mydriatics. The iris in each eye was tremulous and grossly atrophic, being completely devoid of pattern and being practically transparent. The central one-third was more atrophic than the remainder. Under general anaesthesia these findings were confirmed, and in addition it was found that the corneal diameter of each eye was 16 millimetres. The intraocular tension was 25 millimetres of mercury in each eye.

The picture was that of a fully developed case of anterior megalophthalmos, an unusual occurrence in an eight months old baby. Because of the gross enlargement of the cornea the case could well be classified as one of gigantophthalmos.

Reference.

VAIL, D. T. (1931), "Adult Hereditary Anterior Megalophthalmos sine Glaucoma: A Definite Disease Entity", *Arch. Ophthalm.*, 6: 39.

PSITTACOSIS IN QUEENSLAND: A REPORT OF A CASE.

By A. F. KNYVETT,
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MANY people carry complement fixing antibodies for the psittacosis group of viruses in their serum although they have not had an illness suggesting this disease. At the Brisbane Hospital, Quinn (1954) found that 50% of a series of patients with pneumonia had titres of one in five or greater, two having figures of one in 320 and one in 2560 respectively, although in none was psittacosis likely. Likewise, Dane (1954) in South Australia found that 22% of the normal population had similar titres. Accordingly most authorities urge caution in the interpretation of serological tests in the absence of an actual isolation of the virus.

The clinical disease seems to be rare in Queensland, for no cases are to be found either in the records of the Brisbane Hospital or in those of the State Department of Health (personal communication by the Deputy Director-General, Dr. D. Johnson). Accordingly, a case is reported in which the diagnosis of psittacosis was more than probable. Briefly, the patient had an illness clinically resembling psittacosis after recent contact with a parrot from an endemic area. Also, the serum titre of antibodies rose during the illness. Isolation of the virus was not possible in Brisbane at the time, and in this respect perhaps the diagnosis is not complete.

Clinical Record.

Mrs. A., aged thirty-nine years, was a parrot fancier and had had two parrots for more than eighteen months before buying a third. This was a Port Lincoln parrot (*Barnardius zonarius*, Shaw) flown from South Australia to Brisbane and sold by a bird shop. The parrot seemed perfectly healthy, but about fourteen days after receiving

it, during which time she had fondled it and kissed its beak many times, the patient began to develop headache, drowsiness and feverishness. She was shivery, coughing and vomiting and had severe pains in her legs, loins and the lower part of her abdomen. She was given sulphonamides, and when there was no response four days after the onset of illness she was admitted to the Brisbane Hospital. On examination, she was obviously very ill. She had a temperature of 104.5° F. She was flushed and drowsy and had a frequently recurring hacking cough which was productive of only a little mucoid sputum. This cough was so frequent and distressing that it was at times difficult to obtain a history. The conjunctivae were injected. Scattered rales and rhonchi were heard throughout the chest; the liver could be felt one inch below the right costal margin and was tender. In addition, both loins and the right iliac fossa were extremely tender, so much so that a surgeon had been consulted regarding the possible presence of an abdominal condition which might require surgical intervention.

An X-ray film of the chest showed mottling and increased markings at the right lung base consistent with a recent inflammatory process. Microscopic examination showed the urine to be normal, and a total white cell count was 7000 white cells per cubic millimetre. Of these cells, 79% were neutrophile cells and 21% were lymphocytes.

With an illness of this nature and the association with a parrot recently arrived from a known endemic area of psittacosis, a clinical diagnosis of psittacosis was made. Treatment with "Terramycin", two grammes daily, was begun. By the end of the next day the temperature was normal. There was a rapid general improvement and the patient was discharged from hospital eight days after her admission.

Complement fixation tests were performed during the patient's illness. Five days after the onset of the disease there was no measurable titre of antibodies. Twelve days and twenty-three days after the onset of illness the titres were one in 16 and one in 32 respectively. Three and a half months after the onset of illness, during an attack of influenza, the titre was one in 32.

When the clinical diagnosis was supported by a rising titre of antibodies, the suspected parrot was examined by the Department of Public Health, Queensland. The bird appeared to be healthy and nothing abnormal was found at autopsy. Impression smears were made of the surface of the liver and lungs, but elementary bodies were not detected. In addition the titre of antibodies in its serum was not measurable. Mouse inoculation tests with organs from the parrot gave negative results for psittacosis. There is thus no positive evidence to identify this bird as the responsible vector. It is possible that one of the other two parrots might have been responsible, but it did not seem justifiable to destroy these as well. They appeared to be healthy and had been in the patient's possession for over eighteen months. Also the significance of the development of an illness about fourteen days after the arrival of the Port Lincoln parrot seemed too great to disregard when the incubation period for psittacosis was known to be about seven to fifteen days (Horsfall).

Eleven other parrots were flown to Brisbane with this one. No records are available regarding their present owners, but so far no other case of psittacosis seems to have been recognized.

Summary.

A case showing the clinical features of psittacosis associated with contact with a parrot from an endemic area and the development of a significant titre of antibodies for the psittacosis-lymphogranuloma group of viruses is reported. Such cases are rarely recognized in Queensland at the present time.

Acknowledgements.

I wish to thank Dr. D. Johnson, of the Department of Public Health, for giving me help and advice and placing

the facilities of the Department at my disposal. The complement fixation tests were performed in the Public Health laboratories. The mouse inoculation tests were carried out by the Animal Health Station, Yeerongpilly. Finally I wish to thank Dr. A. D. D. Pye, Superintendent of the Brisbane Hospital, and Dr. L. D. Walters, under whose care the patient was first admitted to hospital, for permission to publish this case.

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Reviews.

The ABC of Natural Childbirth. By Barbara Gelb, with foreword by R. Gordon Douglas, M.D., Introduction by Grantly Dick Read, M.D., with illustrations by Dorothea Fox; 1955. London: William Heinemann (Medical Books), Limited. 8½" x 5½", pp. 188, with many illustrations. Price: 12s. 6d.

This very readable book is one that every pregnant woman and her obstetrician should read. Mrs. Gelb describes clearly, concisely, and at times humorously, her experiences having her first baby. She not only tells us what she did, but how she felt about it all from the early stages of pregnancy, through the stages of labour to the puerperium. She attended the now well-known Grace-New Haven Community Hospital that is affiliated with Yale University, and followed their "Preparation for Childbirth" programme under the direction of Miss Keane. Current medical journals contain references to this programme and to others that follow Dr. Grantly Dick Read's teaching, and describe them for mothers, nurses and doctors; it is therefore particularly interesting and valuable to read the impressions of a patient who has no medical knowledge.

The Grace-New Haven Hospital really tries to provide all facilities for natural childbirth, including "rooming in" for those who wish it; and fathers are encouraged to be present in the first stage of labour. There is a delightful chapter describing Miss Keane's talk to fathers, the gradual conversion of a father to the acceptance of the role during pregnancy and labour, and his final proud description of how "we" got through the "transition period". There are over a hundred clever and amusing sketches to illustrate the main points and to show the exercises in some detail.

The main value of this book to the expectant mother is that it tells her exactly what to expect—not "painless childbirth", but an extremely strenuous and at times very uncomfortable experience for which women should prepare thoroughly. Mrs. Gelb describes the exhilaration and the joy of natural childbirth without understating its discomfort. She discusses the pros and cons of "rooming in", and altogether gives a very clear picture of how the modern mother can be helped to cooperate with her doctor. A distinguished obstetrician stated at the recent Congress that women do not enjoy their first baby because they have so much to learn; this book tells how one mother got off to an excellent start and really did enjoy her baby. It is hoped that many obstetricians will read the book and recommend it to their patients.

Heart Disease: Its Diagnosis and Treatment. By Emanuel Goldberger, M.D., F.A.C.P.; Second Edition; 1955. Philadelphia: Lea and Febiger; Sydney: Angus and Robertson, Limited. 9½" x 6", pp. 782, with 107 illustrations. Price: £6 17s. 6d.

THERE are three classes of medical text-books: firstly, an elementary account of common diseases affecting the system in question; secondly, a detailed description of each disease in all its variations; and thirdly, a comparison between the two types.

A prodigious and sustained effort is necessary to produce a modern text-book which concerns itself with any medical specialty. So rapid is modern medical progress, and so great is the overlap with other subdivisions of medicine, that the modern author, no less than his publisher, must wonder whether the industry and finance involved are worth the risk of the book's becoming obsolete within two years.

Yet each year increasing waves of texts and monographs, especially from America, are confidently offered to the impecunious physician, already fully involved in journal subscriptions, and in spite of the fact that no particular gaps exist. National fame in American medicine requires a personal text-book. This is an admirable custom for the medical reading public, but imposes a difficult judgement for reviewers. The majority of such works are identical in content and format; many authors modestly avoid the personal pronoun, and coldly present an abbreviated cross-section of current views. Emanuel Goldberger in "Heart Disease: Its Diagnosis and Treatment" has no such scruples, and dogmatically describes his own therapeutic practices in detail. This makes his book more interesting and even controversial—two necessities in the enjoyment of reading. The therapist is presented with a definite plan of attack, with values placed upon each therapeutic agent by an experienced clinician. It is also refreshing to find at least one prominent American cardiologist who teaches and practises the use of the unaided senses in the recognition and classification of heart disease. "The doctor should always remember that within himself lie great diagnostic potentialities." The work begins, therefore, with the normal heart, and the physical X-ray examination, electrocardiography and tests for circulatory efficiency, which accompany it. He has obviously assumed that the reader requires this basic information or refreshment, and in this section nothing has been omitted because it was considered too elementary. The next area covered is that of symptoms and signs of heart disease in general, and this is also very complete with physiological explanations for abnormal physical phenomena detectable at the bedside. Altogether, 180 pages, or one-quarter of the book, are devoted to these fundamental matters. A valuable but over-concentrated chapter describes the normal and abnormal ballistocardiogram. Another useful guide deals with the radiographic appearances of the infant's heart. The short chapter on vectorcardiography does not do justice to this valuable exercise and its contributions, and would be better enlarged. Goldberger's remarks on electrocardiography, and the accompanying illustrations, constitute a miniature treatise in themselves and are of course authoritative.

The remainder of the book follows the normal aetiological subdivisions of cardiology, the clinical syndromes of congestive failure, shock, cardiac arrhythmias, and special conditions complicating heart disease. Descriptions are terse, dogmatic and factual. Statistics are not used frequently, which is something to excite a thankful sigh on the part of the reader. Congenital heart disease is given the due prominence demanded in a modern text-book, and there are brief descriptions of the application of the newer laboratory techniques, such as cardiac catheterization, angiocardiology, electrokymography, dye curves, oximetry *et cetera*. In this edition, new features include accounts of electrolyte disturbances arising in the course of the treatment of congestive heart failure, brief reference to the use of carbonic acid anhydrase, and a good description of the use and abuse of cation exchange resins in the management of cardiac oedema. Mitral valve surgery receives rather less attention than a 1955 edition should contain. The application of the newer hypotensive drugs receives adequate coverage, though the author's experience with pentolinium tartrate has obviously been small. The chapters on congenital heart disease are preceded by a highly concentrated review of the development of the heart, and are well arranged. A good array of pharmacological and physiological facts are to be found in the clinical and therapeutic sections.

Some surprising statements occur, such as: "Dullness to the right side of the sternum is occasionally due to right aortic arch", and "a loud (first) heart sound can be due to infarction of a papillary muscle", and "rarely an abnormal epigastric pulsation may be due to a diverticulum of the left ventricle". The author has been anxious to omit nothing, a practice which misleads the student. While classical physical signs are all mentioned, there is no appreciation of the diagnostic value of a close study of basal heart sounds, ejection sounds and the analysis of the relative intensity and temporal changes of these phenomena. British cardiologists would quickly dispute the statements that an "opening snap occurs only with a scarred and fibrous mitral valve", and that in constrictive pericarditis the protodiastolic vibration is "due to the impact of the heart against the calcified pericardium". Goldberger is an advocate of rapid digitalization as a routine.

Nevertheless, we have in Goldberger's "Heart Disease" a complete coverage of the whole field of cardiology, an individualistic and essentially practical manual for the practitioner and junior cardiologist, devoid of statistics, quotations, case reports, and persiflage. The work constitutes an honest *credo*, and reveals the author's wide and detailed knowledge of all branches and byways of his subject. His

advice and descriptions of therapy constitute the most valuable contribution, and are so well presented that his attitude alone will assure the book a place among the best of its class. A representative bibliography concludes each chapter.

Handbook of Pediatrics. By Henry K. Silver, M.D., C. Henry Kempe, M.D., and Henry B. Bruyn, M.D.; 1955. California: Lange Medical Publications. 7" x 4", pp. 556. Price: \$3.00.

THE aim of the authors of this handbook has been to present to the practising doctor and medical student a concise and readily available digest of the material necessary for the diagnosis and management of paediatric disorders. Emphasis has been placed on the clinical aspects of the subjects covered, but summaries of physiological principles have been included whenever the authors thought it necessary. The idea has been to supplement rather than to replace more complete books on paediatrics, although in places (for example, parts of the chapter on emotional problems) the detailed treatment does not seem to conform to this—more from the inherent difficulty of presenting certain types of material in condensed form than from any fault on the part of the authors. The extent of the information included will make the book acceptable to experienced practitioners as well as to younger men. It is practically impossible to examine in full a book of this character for review purposes, but the material presented appears to be of a standard character, and the fact that the authors are teachers of paediatrics in well-known medical schools and had the assistance of a large group of collaborators is a reasonable guarantee of orthodoxy.

Paediatric Diagnosis. By Morris Green, M.D., and Julius B. Richmond, M.D.; 1954. Philadelphia and London: W. B. Saunders Company, Melbourne: W. Ramsay (Surgical), Limited. 10" x 7", pp. 454, with eight text-figures. Price: £4 15s.

THE aim of this book is "to help students and practitioners to increase their diagnostic skill through a systematic and integrated approach to patient study that can readily be applied at the bedside or in the office". The emphasis is on the whole child, not on mere diagnosis of physical disease, though this does occupy most of the book. Stress is laid on the doctor's ability to "evaluate a presumably healthy child", so in each section normal growth and development are discussed.

This book is a valuable addition to paediatric literature and presents its material in a new way. It is written by clinicians, and both paediatricians and general practitioners will find it useful for reference. It is divided into four sections: history taking, physical examination, symptomatology and health supervision. The writers insist that in order to make a correct diagnosis the doctor must be thoroughly familiar with the normal child and have a good understanding of his physiology and psychology and of the normal routines of living. Therefore, in a section such as examination of the skin they describe the skin care of the newborn, how to bathe a baby, a few remarks on clothing, normal variations in pigmentation *et cetera* before any description of the abnormal is given. The section on constipation describes normal stools, the physiology of defecation and the modern approach to bowel training, and then deals with abnormal conditions.

A valuable innovation in the method of presenting material is the inclusion of references in the text at the end of each paragraph on a particular subject. This has the effect of making the reader wish to look them up instead of his having to search through a long and discouraging list of references at the end of a chapter. The lack of illustrations is no disadvantage, as one does not feel the need for them.

The chapter on health supervision deals with prophylactic medicine and stresses a role of the physician not fully appreciated in this country. American paediatricians are apparently occupied more than half their time in "well baby and well child care" and seem to regard their main function as that of keeping children well, and it will seem somewhat surprising to us to read a caution "not to lose interest and competence in the management of the physical problems of children". At the end of the book is a table of body measurements and weights that will prove useful.

All the symptoms of illness in childhood are comprehensively covered with brief discussions on most causes of such symptoms, the material is up to date and reliable, and most doctors interested in children will find the book stimulating and informative.

Books Received.

[The mention of a book in this column does not imply that no review will appear in a subsequent issue.]

"Il Sottosesso nel Popolo Senza Tonsille", by I. e G. Calderoli; 1954. Bergamo: Tipografia Orfanotrofo Maschile. 7½" x 5", pp. 156.

The theme of this brochure is that the tonsil has, in addition to its protective function, an endocrine function connected with sex.

"Donne e Fanciulli . . . Meno Felici", by I. e G. Calderoli; 1955. Bergamo: Scuole Professionali T.O.M. 7½" x 5", pp. 232.

The authors, holding that the tonsils have an endocrine function, blame their total removal for the development of hyposexuality, decadence and premature old age.

"Cardiac Diagnosis: A Physiologic Approach", by Robert F. Rushmer, M.D.; 1955. Philadelphia and London: W. B. Saunders Company, Melbourne: W. Ramsay (Surgical), Limited. 10" x 6½", pp. 454, with many illustrations. Price: £5 15s.

Divided into five parts dealing in turn with the function of the normal cardio-vascular system, its regulation, congestive heart failure, methods of cardiac diagnosis and the diagnosis of cardiac disease.

"Cardiovascular Surgery: Studies in Physiology, Diagnosis and Techniques", Proceedings of the Symposium held at Henry Ford Hospital, Detroit, Michigan, March, 1955, edited by Conrad R. Lam, M.D.; 1955. Philadelphia and London: W. B. Saunders Company, Melbourne: W. Ramsay (Surgical), Limited. 10" x 6½", pp. 572, with many illustrations. Price: £6 7s. 6d.

This was an international symposium. The participants numbered 50 and the "discussants" 17.

"La Guérison", par le Dr. Jacques Sarano; 1955. Paris: Presses Universitaires de France. 7" x 4½", pp. 128.

A study of healing as it affects both doctor and patient, with philosophical reflections on their relationship.

"Nursing Care of the Newly Born Infant", by W. S. Craig, B.Sc. (Glas.), M.D., F.R.C.P. (Edin.), M.R.C.P. (Lond.), F.R.S.E., in collaboration with M. F. G. Buchanan, M.B., Ch.B., M.R.C.P. (Edin.), D.C.H. (Lond.), R. J. Pugh, M.B., Ch.B., M.R.C.P. (Lond.), and Miss M. Pattullo, R.G.N., S.C.M., with a chapter on mothercraft contributed by Miss M. J. W. Taylor, R.G.N., S.C.M., M.T.D.; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 8½" x 6", pp. 480, with 225 illustrations. Price: 35s.

The theme of this book is based upon the fundamental importance of clinical observation in professional care of the newborn infant.

"Modern Actinotherapy: A Review of the Literature, Giving an Outline of Indications and Technique", compiled by Raymond H. Beckett, B.A., with preface by Francis Bach, M.A., D.M. (Oxford), D.Phys.Med.; 1955. London: William Heinemann (Medical Books), Limited. 7½" x 5", pp. 169, with 24 illustrations. Price: 17s. 6d.

The subtitle describes the scope of this book.

"The Year Book of Obstetrics and Gynecology (1955-1956 Year Book Series)", edited by J. P. Greenhill, B.S., M.D., F.A.C.S.; 1955. Chicago: The Year Book Publishers, Incorporated. 7½" x 5", pp. 544, with 83 illustrations. Price: \$6.00.

One of the "Practical Medicine Series" of Year Books.

"Practical Neurology", by Leo M. Davidoff, M.D., and Emanuel H. Feiring, M.D.; 1955. New York: Landsberger Medical Books, Incorporated; distributed by the Blakiston Division of the McGraw-Hill Book Company. 8" x 5½", pp. 442.

Intended for the physician engaged in general practice as a concise clinical reference guide in neurology.

"The Book of Children", by Thomas Phaïre; 1955. Edinburgh and London: E. and S. Livingstone, Limited. 7½" x 5", pp. 76. Price: 7s. 6d.

First published in 1545 as an addition to "The Regiment of Life", translated by Phaïre from the French.

The Medical Journal of Australia

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All articles submitted for publication in this journal should be typed with double or treble spacing. Carbon copies should not be sent. Authors are requested to avoid the use of abbreviations and not to underline either words or phrases.

References to articles and books should be carefully checked. In a reference the following information should be given: surname of author, initials of author, year, full title of article, name of journal, volume, number of first page of the article. The abbreviations used for the titles of journals are those adopted by the Quarterly Cumulative Index Medicus. If a reference is made to an abstract of a paper, the name of the original journal, together with that of the journal in which the abstract has appeared, should be given with full date in each instance.

Authors who are not accustomed to preparing drawings or photographic prints for reproduction are invited to seek the advice of the Editor.

POLIOMYELITIS VACCINE.

THE divergent opinions on the efficacy and safety of the Salk vaccine for the prevention of poliomyelitis that were expressed early in 1955 will be remembered by all medical practitioners; indeed the subject is still one for lively debate. The enthusiasm of some immunologists was matched by the caution of others, and caution was justified. D. W. Johnson, of the Department of Health and Home Affairs, Queensland, reported in this journal on May 7, 1955, after a study abroad under the auspices of the World Health Organization, that the Salk vaccine was safe, but that the degree and duration of protection conferred by it would not be known until a report by the "evaluation committee" was released. Sir Macfarlane Burnet, in a "special article" contributed to this journal by request, and published on April 30, 1955, showed commendable caution. He stated, *inter alia*, that the results obtained by tests in America were strictly speaking applicable only to the vaccine prepared and used in 1954. He added, however, that they could legitimately be extended to cover all vaccines made by the Salk procedure which had an equal or better content of virus antigen and which had satisfied the test requirements for sterility and antigenic power. He pointed out that any relaxation in technical control would make it possible (a) that live virus in the vaccine would produce paralytic infection in some of those inoculated, or (b) that the vaccine would be deficient in antigen and hence in immunizing potency. He included the following paragraph in his summary:

In view of the fact that any test of a new poliomyelitis vaccine would have to be made on a similar scale involving millions of pounds' expense if it was to provide a definite assessment, we can feel certain that for at least five years the Salk vaccine or minor improvements thereof will be the standard agent for the prevention of poliomyelitis.

It will be remembered that not long after the jubilation caused by the announcement that Salk had prepared his vaccine, ardour was somewhat damped by the occurrence of cases of paralysis soon after vaccination. Salk's trial vaccine was prepared in culture of tissue from the kidney of monkeys, and in this were strains of virus, including type I, Mahoney, virus which is known to be more virulent than other types. It was concluded that in the cases in which paralysis had occurred there remained some live virus which had not been inactivated by treatment with formaldehyde as it should have been. In these circumstances doubt and lack of enthusiasm were easily understood. As a matter of fact opinion in some places was sharply divided. It was pointed out that in the first investigation the virus fluid had been inactivated at one centre; later on vaccine was prepared at several centres, and it is reasonable to believe that slight variations in technique took place. A preponderance of cases of paralysis among persons inoculated by vaccine from one laboratory certainly pointed to this. Actually most of the cases were due to the activity of Type I, Mahoney, virus. It clearly then becomes a condition for the use of poliomyelitis vaccine that each batch shall be submitted to safety tests; in other words, only when this has happened shall the members of the community be urged to submit themselves or their children to inoculation. When American enthusiasts were extolling the virtues of the Salk vaccine, authorities in Great Britain were strangely silent and seemed to stand completely aloof. British caution in matters of this sort is proverbial and has more than once been shown to be justified. It is with some satisfaction therefore that we read in an editorial in the *British Medical Journal* of January 21, 1956, that a vaccine against acute poliomyelitis is being prepared by two firms in Britain for use this year, and that the Ministry of Health has made plans for its distribution. Safety tests, we are told, have been carefully devised and made more sensitive; in general they follow the original tests developed in the United States of America. The editorial discusses the best way in which the "British vaccine" shall be used; this is outside the scope of our present discussion and must be left to those specially interested in the subject.

This matter has been the subject of considerable activity in Australia. It was dealt with at the fortieth session of the National Health and Medical Research Council held at Sydney on November 24 and 25, 1955. The council expressed the belief that "the intended methods of manufacture and checking will ensure a safe and effective product" and it made three recommendations. The first was that the Commonwealth Serum Laboratories should proceed with the manufacture and issue of Salk type poliomyelitis vaccine. The second recommendation was as follows:

That the Council agrees with the suggestion of the Director of the Commonwealth Serum Laboratories that before the C.S.L.'s product is issued for purposes of public vaccination, it should, if this can be arranged, be submitted to a final check by an independent authority not directly associated with the Commonwealth Serum Laboratories.

With the general idea of this resolution everyone will agree; the implication is, however, that if a final check by an independent authority cannot be arranged, the vaccine will be issued just the same. This possibility should be resisted by every available means. One clause in another

resolution adopted by the National Health and Medical Research Council states that poliomyelitis control is a major public health problem in Australia, and that the issue of poliomyelitis vaccine should therefore be restricted to State Public Health Authorities until the projected mass immunization programme and its associated evaluation studies have been completed. This arrangement is probably wise, though there may be two opinions about it. If it is carried into effect, however, the practising members of the profession will have the duty of prevailing on their patients to take children and others to the immunizing authority. They cannot and will not have any part in the business unless they are assured that the vaccine to be used is both effective and free from residual live virus. If there is no "independent authority" for the checking of poliomyelitis vaccine and other products, the Federal Government should create one; and it could do this as a department of the Australian National University at Canberra.

Only two of the Council's three recommendations have been mentioned; for the sake of completeness the third should be stated, though it is rather obvious. It is as follows:

That the Council expects that active research will continue in Australia and elsewhere to develop an avirulent or attenuated strain of each of the three types of poliomyelitis virus at present proposed to be used in the vaccine. Should strains be developed which can be shown by responsible authority to be potentially less virulent to humans, to possess adequate antigenicity and in all other respects to be acceptable for the production of vaccine, the opportunity should be promptly taken to substitute these for the fully virulent strains in current use.

Current Comment.

THE HUMAN VERMIFORM APPENDIX.

For the past thirty-two years Donald C. Collins has been studying material relating to the human vermiform appendix collected from a group of hospitals in the United States. A total of 50,000 specimens was considered. In a paper¹ which is the culmination of a long series of contributions on the subject, Collins puts forward a number of general facts and conclusions that are of interest. The specimens studied were mostly (90%) surgically removed by more than 250 leading American surgeons in 11 different approved hospitals; the remainder were examined *post mortem*. Collins points out that in the earlier years many interesting pathological entities went unrecognized; so the total incidence figures of specific pathological conditions are probably too low. This was borne out by, for example, a reexamination of old microscopic slides to determine the approximate incidence of *Histoplasma capsulatum* in the specimens. It was soon apparent that many instances had gone unrecognized in the earlier years of the study, and the unexpectedly high incidence of 7.81% was found. In 13% of cases mycological parasitic diseases were present; this includes the 7.81% incidence of histoplasmosis already mentioned and (the only other major figure) a 5% incidence of amoebiasis. Benign tumours were encountered in 4.34% of the series and primary malignant tumours in 1.26%. Unusual foreign bodies (these do not include faecoliths) were found in the lumina of 1.3% of specimens; 38.78% contained faecoliths. Appendiceal fistulae were recorded in only 0.45% of cases. Among interesting miscellaneous rarities found were four examples of proved congenital agenesis, two of true congenital duplication and

two of intussusception; 15 patients had *situs transversus viscerum abdominis* (10 with dextrocardia). Of 6710 cases in which the lumen of the appendix was mentioned, it was described as totally obliterated in 9.5% and incompletely obliterated (to a varying extent) in 25.5%.

On the surgical aspects Collins has some interesting points to bring forward. He states that of 33,810 cases in which the records describe the position of the appendix within the abdominal cavity, it was anterior to the caecum in 74% and retrocaecal in 26%. The trend in mortality associated with acute appendicitis is of great interest. A striking graph shows a downward curve from a mortality of 13.9% in 1925 to 0.01% in 1955—nearly a thousandfold reduction, as Collins points out. This is, of course, splendid, but Collins's comment is perhaps a little unfortunate for publication in a journal with a world-wide circulation. He writes: "This chart should furnish all of the sermons necessary to convince others of the great strides made in American surgery during the past 30 years by private initiative and American 'know-how', at least as far as appendicitis is concerned." The chart certainly shows that great strides have been made in American surgery during the past thirty years, but results at least as good from England and Australia (and elsewhere, no doubt) can be readily quoted without undue searching. In 1940 K. Starr, of Sydney, published in this journal his results in a series of 1418 cases of acute appendicitis; there were nine deaths, making a mortality rate of 0.7%, as against a rate of about 5% for 1940 shown on Collins's graph. In a comment in these columns on March 20, 1948, we quoted the following mortality rates for Victorian surgeons: in 1931 Newton's figure at the Melbourne Hospital was 5.2% (Collins's figure for 1931 is over 12%); in 1934 Brown at the Alfred Hospital, Melbourne, had a rate of 3.9%; and in 1935 Ross's mortality rate at the Geelong Hospital was 1.8% (Collins's figure in 1935 was about 10%). In a letter to this journal in the issue of April 24, 1948, V. J. Kinsella, of Sydney, quoted a personal series of nearly 400 cases of acute appendicitis, with no deaths. In the issue of December 15, 1951, E. Stuckey reported a mortality rate of 0.4% in 1514 cases of acute appendicitis at the Royal Alexandra Hospital for Children, Sydney; this figure, particularly as it is for children, compares more than favourably with the results indicated on Collins's graph. Turning to English figures, without searching far we may quote C. P. G. Wakeley and P. Childs's series² of 217 cases of acute appendicitis at King's College Hospital, London, between 1947 and 1949, with no deaths. Not all the published figures are as good as these; for example, G. E. Moloney, W. T. Russell and D. C. Wilson³ reported a mortality rate of 1.4% in a series of over 1000 cases at the Radcliffe Infirmary, Oxford, between 1945 and 1948. However, even these figures stand comparison with those on Collins's graph, and it must be accepted that the lowering of mortality rates is, happily, part of a world-wide trend. The American results and progress are certainly good, and Collins has done a service with his investigation of this enormous series of cases. However, his comments make it impossible to resist pointing out the fact that all the world's surgical "know-how" has not been corralled between the Pacific and Atlantic Oceans.

TOBACCO AND CORONARY DISEASE.

KING JAMES I in the year 1604 published anonymously the "Counterblast to Tobacco". Since this vituperative outburst arguments over the ill effects of tobacco have torn families and provided society with conversation in its drawing rooms and with languorous pipe dreams over its after dinner port. There was much opinion and little fact until R. Doll and A. B. Hill⁴ terrified the smoking public with the menacing shadow of carcinoma of the lung. Medical smokers are still fighting a rearguard action, but the field has largely been taken by those "agin it", and the

¹ Brit. M. J., December 16, 1950.

² Brit. J. Surg., July, 1950.

³ Brit. M. J., September 30, 1950.

⁴ Surg., Gynec. & Obst., October, 1955.

large tobacco firms have donated money to be used for research into the causative carcinogen. There are now whisperings that carcinoma of the lung may not be the only danger of the revered leaf.

L. H. Sigler¹ has made a notable survey of the smoking habits of 1520 patients in whom there was demonstrable coronary disease associated with the syndrome of *angina pectoris*. Of these people, 811 were non-smokers and 709 were habitual smokers from youth. Classifications were made according to the age of onset of clinical manifestations of coronary disease, the age of onset of the first attack of coronary occlusion and the age at death when this had subsequently taken place. The smokers were also subdivided according to their smoking habits. Of the patients surveyed, 535 have died since their records were completed. From the comparisons of the results it is apparent that the smokers tended to develop their coronary signs at a considerably earlier age than the non-smokers. The average of onset also varied according to the amount of tobacco consumed. Thus, of patients who smoked heavily, for instance, more than thirty cigarettes a day, 60.4% developed symptomatic coronary disease as opposed to 29.2% of male non-smokers who did so. A similar tendency is to be found in the age of onset of the first coronary occlusion in patients in whom this had occurred. The age of death was also related to the smoking habits of the subjects investigated. Thus 35.1% of the heavy smokers and 6.4% of the non-smokers died before the age of fifty.

L. H. Sigler in discussing these results suggests that nicotine from the tobacco causes repeated stimulation of the sympathetic ganglia, which in turn produces widespread vasospasm resulting after many years in anoxemia of the main vessel walls. Nicotine may also cause adrenal stimulation with consequent increase in the basal metabolic rate and cardiac acceleration with increase in the rate of wear and tear. The appreciable loss sustained by smokers in the wasteful combination of haemoglobin with carbon monoxide may also hasten degeneration by contributing to vessel anoxemia. The other constituents of tobacco smoke such as pyridine, aldehydes and methyl alcohol may play a part in the degenerative process. Tobacco smoking probably results in other disturbances of the respiratory and gastro-intestinal tracts, and these in turn may contribute towards the general disturbance in cardio-vascular metabolism. The well-known association between tobacco and *thromboangiitis obliterans* may indicate that there is an element of tobacco allergy. The author finally warns his readers that the effect of tobacco may not be to cause, so much as to accelerate, an inherent tendency for the degeneration of the coronary vessels in susceptible individuals.

The series of cases is large and the figures are convincing. Even so, if tobacco can be incited as a contributory cause of degenerative heart disease, it is obviously not by any means the main one. The psychiatrist has attributed an oro-erotic origin to the desire for the pipe and the cigarette. It may well be that diseases which appear to arise from tobacco do so because of the abnormal wear and tear of the syndrome of social stress and the unhappy imbalance of mind which itself finds solace in the blue smoke of smouldering leaves.

PRINCE ALFRED.

Two of Australia's leading teaching hospitals, the Royal Prince Alfred Hospital in Sydney and the Alfred Hospital in Melbourne, are named after the second son of Queen Victoria, but few people know much about him. The editor of the *Alfred Hospital Clinical Reports* found² that in a random questionnaire a class of 30 Melbourne students showed great ignorance of Prince Alfred, and, lamenting this, he has sought out what we all should know from the contemporary literature and presented it in charming and readable form.

The association of Prince Alfred Ernest Albert with Australia arises from his visit paid in 1867—the first Royal Visit to the Australian Colonies. Happily, in the light of recent events, he had been created Duke of Edinburgh (as well as Earl of Ulster and Kent) in the previous year; and although only twenty-two years of age, was on a world tour in command of H.M.S. *Galatea*, a ship of 3327 tons and 317 feet in length, which made 13 knots under steam and carried 22 10-inch guns. After a tremendous welcome in Adelaide, the first port of call, the Duke made his way to Melbourne, where "feverish planning" was going on. To read about the preparations today, we are told, "makes the little to-do about the Olympic Games seem like a kindergarten tea-party". People spoke their minds with few inhibitions in those days, and the Melbourne Reception Committee did not want for urging. However, when the time came (the Duke landed at Sandridge (or Port Melbourne) on November 23, 1867), Victoria and Melbourne "did him proud". This is good to hear, though Sydney-siders may pause at a passing statement in the editorial article to the effect that "Melbourne was then, as it is now, the finest city in Australia". In any case, the Duke some little time later had the pleasure of visiting the Mother City of the Colony at Port Jackson. Unfortunately, in some ways at least, things went wrong in Sydney. On March 12, 1868, the Duke attended the "Sailor's Home Picnic" at Clontarf, an "agreeable spot" (to say the least) on the north shore of Middle Harbour in Sydney. After lunch, he went strolling along the shore with the Governor's wife, but an Irishman named O'Farrell most inhospitably shot him in the back with a pistol, creating a considerable sensation. Fortunately the wound proved to be not serious. The bullet was removed successfully, and the Duke recovered; so that he was able to appear in public on March 28, and laid the foundation stone of the Sydney Town Hall on April 4. He left for home on April 6. O'Farrell was hanged for attempted murder on April 21.

The fortunate aspect of the incident (apart, of course, from the Duke's recovery) was that a great wave of indignation arose, and on its tide the Prince Alfred Hospital in Sydney and the Alfred Hospital in Melbourne came into being, as gestures intended (in the words of Dr. John Blair in a letter to the *Argus* on March 25, 1868) "to endeavour to remove in some manner the terrible stigma". So we have two notable memorials to our first Royal visitor, who was, we are told, "a fine and noble character, an earnest, serious and gifted man whose Royal breeding was enhanced by his own high qualities". Of lesser import are the 30 streets and half a dozen hotels in Melbourne which, according to the editorial article, are still called after Prince Alfred, Duke of Edinburgh. Sydney has 31 streets but only five hotels bearing the Royal name; so in that the honours are even.

NUTRITION AND PREGNANCY IN AUSTRALIA.

THE process of childbirth involves the creation of a second separate independent living being where there was previously only one. The hereditary pattern is already determined at the time of conception. The interplay of incompatibilities of blood relationship is well understood, and the passage of passive immunity against some infectious diseases is accepted. These are factors concerning only the mother and the fetus. The importance of the intrusion upon the scene of the third force, which is the external environment, is not so clear. The influence of extraneous factors in relation to the toxemia of pregnancy, the physical condition of the child at birth and the efficiency of lactation is still little understood. In 1952 R. H. J. Hamlin³ described methods used in the prevention of preeclampsia and eclampsia, and some comment was made upon the subject in this journal.² The rates of eclampsia among women cared for at the Women's Hospital, Crown Street, Sydney, during the years 1936 to 1947 was one in 350 cases despite a high degree of antenatal

¹ *New York State J. Med.*, November 1, 1955.

² *Alfred Hosp. Clin. Rep.* (1955), 5:1.

³ *Lancet*, January 12, 1952.

² *M. J. AUSTRALIA*, March 8, 1952.

care. The incidence of the condition was approximately the same at other large obstetric centres and had not decreased for many years. After 1947 more active measures were taken to prevent eclampsia by the early detection of the toxæmic state. Supervision was vigorously maintained, attention was paid to the levels of blood pressure rather than to albuminuria, patients were instructed in proper diet, and their fears of pregnancy were allayed. Digital oedema was recognized to be an important early sign of toxæmia in the young *primipara*, even before the onset of hypertension. When digital oedema developed at the thirty-first week the patients received precise advice on the taking of a salt-free diet with a high protein, high vitamin and low carbohydrate content, and supervision was increased. As detection of the early signs of toxæmia was intensified, more ante-natal patients were admitted, eclampsia disappeared, and severe preeclampsia became increasingly infrequent. Caesarean section and prematurity, due to the induction of labour because of toxæmia, ceased to occur. It was further noted that the young *primipara* who was later to become toxæmic had almost invariably increased in weight by more than eight pounds between the twentieth and thirtieth weeks of pregnancy. Hamlin suggested that this weight-gain sign was not so significant in the *multipara* or in those patients with essential hypertension. Accurate control of diet brought about a rapid decrease in the numbers of patients with preeclampsia, and toxæmia in the more severe cases was reduced. Hamlin thought that toxæmia was due to an imbalance of diet with excess of carbohydrates during the twentieth to thirtieth weeks of pregnancy. The average Australian diet appeared to contain an excess of carbohydrate-rich foods, especially during late summer and early autumn.

Joan M. Woodhill¹ later published the results of a survey of the diets of pregnant women living in Sydney during 1948 to 1950. The subjects were all Australian-born, and in none was there any significant clinical abnormality at the first visit to the King George V Memorial Hospital for Mothers and Babies. All the first interviews were conducted in the first trimester of pregnancy, a second was conducted later, a third took place shortly after the confinement, and if the mother attended the post-natal clinic she was interviewed for the fourth and final time. Woodhill considered that a high degree of homogeneity of population resulted in a dietary pattern derived from the British Isles. Of the women, 186 were included in the final census, and they represented a fairly accurate cross-section of the economic level of society. The diets were related for adequacy to the liberal minimal recommendations of the National Research Council of the United States of America. Of the women studied, 15% were, prior to the pregnancy, receiving diets containing less than 50% of the minima of the important constituents. Later in the pregnancy up to 20% were receiving a very poor diet. Prior to the pregnancy only 16% of the patients were receiving a good or excellent diet, and this fell to 13% in the second half of pregnancy. The survey did not indicate that insubstantial diets were due to poverty. There was widespread failure to appreciate the importance of adequate diet both for the mother and for the fetus.

Joan M. Woodhill *et alii*² have now correlated the findings of maternal nutrition in the same group of pregnant women with the incidence of toxæmia, the physical condition of the infant at birth and the duration of lactation. Of the 186 women, 14% eventually had some sign of toxæmia. This may be compared with 11.6% for all King George V Hospital pregnant subjects in 1949 to 1950, and with 12.9% in a similar survey carried out at the Boston Lying-In Hospital. Of the Sydney mothers receiving a very poor diet 42.1% had subsequent toxæmic signs; of the mothers on an excellent diet 5.6% had subsequent toxæmic signs. These figures compare with those found at Boston and with the rather less specific figures of the Australian National Health and Medical Research Council.³ Woodhill further notes that there is a significant statistical association between pre-pregnancy obesity and the incidence of

subsequent toxæmia, but no association was found between excessive weight gain during pregnancy and the incidence of toxæmia. However, other studies do indicate that there is an association between toxæmia and weight gain, related more to the rate of weight gain than to the amount. Unpublished figures from the Harvard group working at the toxæmia clinic of the Boston Lying-In Hospital agree with the findings of Hamlin that excessive weight-gain between the twentieth and thirtieth weeks of pregnancy is a clear warning of impending toxæmia.

Woodhill found that the incidence of prematurity did not appear to be related to dietary deficiency prior to the pregnancy, but was particularly related, in this series, to maternal dietary deficiency in the second half of pregnancy and may be related to the available protein and calcium demanded by the fetus. There was a definite relationship between maternal diet and average birth weight. Average birth weights were eight pounds eight ounces in good diet groups, seven pounds seven ounces in the moderately good diet groups, and five pounds three ounces in the poor diet groups. Average fetal lengths were 51.8, 50.0 and 47.2 centimetres respectively in the three dietary groups. These findings are at variance with those of the National Health and Medical Research Council study. The sample of women used in the Sydney survey was too small to allow for significant comparisons of the maternal nutrition with the frequency of miscarriage, stillbirths, neonatal deaths and congenital defects. Finally, Woodhill has made an appraisal of the duration of lactation in the same sample of Sydney women. The findings of these investigations are that 6% of women from the very poor diet group completely breast-fed their infants through the first seven months of life as compared with 74% in the well-fed groups.

The original group of 186 Sydney women has been exhaustively studied. Some significance is taken from the results by the smallness of the sample. However, the findings, together with those of Hamlin, indicate the very great importance of a well-balanced diet in the pregnant woman. Figures of the National Health and Medical Research Council agree in some, but not all, respects. No adequate explanation can be offered for the difference between these findings and those in western Europe during the lean years of the hungry forties. Workers in Britain were obtaining very significant decreases in the rate of toxæmia and improvement in fetal health at a time when the average diet was persistently below even poor Australian standards, though great attention was paid in Britain to the supplementing of the maternal diet with extra milk, vitamins and proteins. Particularly in Holland was the food shortage for a time acute. Here also there appeared to be comparatively little effect upon either mother or fetus. A really accurate determination of maternal diet is very difficult; the patient's word cannot always be taken. Furthermore, diet is intimately related to the personal intelligence and interest of the mother. The good common-sense mother is much the more likely to have all the conditions of her pregnancy under control and to be subsequently the better mother of her infant. There can be no doubt of the importance of diet in pregnancy, but its inadequacy may be not only a cause but also a sign pointing to inherent failure of satisfactory maternity.

CORONARY DISEASE AND MYOCARDIAL INFARCTION.

MANY current text-books of cardiology and pathology quote and accept the important work of Blumgart, Schlesinger and Davis, published in 1940, on the coronary circulation. This work, which was based on an improved technique for the injection of the coronary arteries devised by Schlesinger, apparently demonstrated that occlusion of a coronary artery was frequently not followed by myocardial infarction. This appeared to apply particularly when the occlusive process was slow, and it was concluded

¹ M. J. AUSTRALIA, August 9, 1952.

² Am. J. Obst. & Gynec., November, 1955.

³ Commonwealth Department of Health, Canberra, 1948.

that such factors as the development of a collateral circulation were responsible. Now, however, these conclusions have been questioned by three Manchester investigators, P. J. D. Snow, A. Morgan Jones and K. S. Daber.¹ They used Schlesinger's technique for examination of the coronary arteries, but their study of the myocardium was much more detailed than that employed by Blumgart, Schlesinger and Davis. They state that when they began their study they expected to be able to confirm the views of Blumgart and his colleagues and to obtain similar figures for the incidence of infarction after occlusion. Blumgart and his colleagues had reported that in 30 subjects, 53 main vessel occlusions had given rise to only 16 myocardial infarcts. Snow, Jones and Daber found, to their surprise, that in 25 subjects, 37 of 41 main vessel occlusions led to at least one corresponding infarct in each instance. Further, in each of the four instances of occlusion without infarction, the occlusion was one of two in the same vessel, and the area supplied by that vessel was infarcted; so, as Snow, Jones and Daber remark, it is not surprising that the second occlusion failed to cause a second infarct. They therefore conclude that when obstruction of a main coronary artery occurs in a human subject, it is almost inevitable that myocardial infarction will follow.

This is, of course, a return to the traditional view, which the work of Blumgart and his colleagues had upset; and Snow, Jones and Daber were naturally interested to determine the reasons for the major discrepancy between the results of two rather similar studies. Further examination of the figures revealed no failure on their part to recognize the occurrence of occlusions—the incidence of occlusions was almost exactly the same in the two series; the discrepancy lay in the frequency of infarction. Consideration of the techniques used to recognize infarction in the two series then revealed a difference that was apparently significant. Snow, Jones and Daber had made a full search of the whole myocardium by the serial slice technique with histological examination of every suspected area, whether or not changes visible to the naked eye were present; whereas the published reports of Blumgart and his colleagues gave no indication that they had made any such examination. The conclusion seems reasonable that the discrepancy may be due, at least in part, to the failure of Blumgart *et alii* to identify all infarcts, with a resultant wrong estimate of the incidence of occlusion with infarction.

Snow and his colleagues quote experimental studies on dogs which show that the gradual occlusion of a main coronary artery in successive stages has often not been accompanied by myocardial infarction, although it occurs after sudden occlusion of a vessel of comparable size. On the other hand, their evidence from human pathological studies indicates that, as a rule, even comparatively gradual occlusion of a coronary artery in a man leads to infarction. The results with human and animal subjects apparently follow different patterns. The explanation suggested for this is that in the animal studies the conditions are experimental, and the remaining unoccluded vessels are healthy; in the human studies the other vessels are often grossly narrowed, or already occluded, and it is more difficult for an adequate collateral circulation to develop.

Further consideration of the role of the collateral circulation in preserving the myocardium when occlusion occurs has led Snow, Jones and Daber to a different conclusion from that of Blumgart and his colleagues. The Manchester workers set out to study the frequency with which the area of infarction extended and to compare the time during which extension might occur with the time necessary for full development of the collateral circulation. They found that in 10 of their 25 cases a single occlusion resulted in an infarct that subsequently extended on one or more occasions without further occlusion. In nine cases the ages of the first and subsequent infarcts were accurately known; in no case did the interval between them exceed eight weeks, and in seven cases it was less than three weeks.

¹ Brit. Heart J., October, 1955.

It is pointed out that the rate of revascularization of the peripheral ischaemic zone may be expected to determine the period during which extension of an infarct is liable to occur; the evidence in the present series suggests that revascularization becomes complete between the third and eighth weeks. Thus it seems that the likelihood of extension of an infarct passes away as the collateral circulation develops.

In summary, the views of Snow, Jones and Daber on the function of the coronary collateral circulation in man are that it probably cannot develop soon enough to prevent infarction when a major coronary artery is occluded, but that it may well serve to limit the area of infarction; and that its major function is to restore an adequate circulation to the surviving but ischaemic peripheral zone, and so abolish by degrees the tendency for extension of necrosis into adjacent ischaemic areas. These conclusions differ considerably from the widely accepted findings of Blumgart, Schlesinger and Davis and throw the matter into the melting pot again. Since the outlook of the clinician and his management of the patient suffering from coronary occlusion must be influenced by his conception of what has happened to the heart vessels and myocardium, further reports will be awaited with interest.

THE MIGRATORY HABITS OF BIRDS.

THE Wildlife Survey Section of the Commonwealth Scientific and Industrial Research Organization is seeking the cooperation of the general public, which includes the medical profession, in their investigation of the migratory habits of birds. This year special attention is being given to silver gulls and crested terns. During November, 1955, officers of the Wildlife Survey Section banded 4000 silver gulls and 16,000 crested terns on the five islands off Port Kembla and on Montagu Island off Narooma. These birds carry a shiny aluminium band on the leg bearing the inscription "Write Wildlife CSIRO Canberra Australia" and a serial number. The weight of the band does not burden the bird and it causes no other danger. Gulls and terns are also being banded along the Victorian coast and on Rottnest Island in Western Australia.

Movement of these birds is not well known, but they do move over large distances, and banded birds could be found in South Australia and even in Queensland. Gulls not only are found on the coast but often move well inland, so that banded birds may be found well away from the coastal areas. If a band is found on a dead bird, it should be returned to the Wildlife Survey Section, Canberra, with details of the time and place of finding. If a banded bird is captured alive, the band should not be removed, but details of band, bird and circumstances should be sent to the Wildlife Survey Section, C.S.I.R.O., P.O. Box 109, Canberra City, A.C.T.

Holiday makers have already sent in details of five silver gulls and two crested terns found on eastern beaches. The request is made that any birds washed up by the sea should be turned over and a search be made for bands. Most bands are never recovered, and this means that the few that are found are of greatest value to the scientist.

THERAPEUTIC SUBSTANCES ACT, 1953.

THE Commonwealth *Therapeutic Substances Act*, 1953, has been proclaimed to take effect from February 1, 1956. Its purpose is to control standards of therapeutic substances imported into, exported from, or manufactured in Australia and distributed interstate. It also provides for control of standards of therapeutic substances supplied in the form of pharmaceutical benefits and to the Commonwealth Government. The committee set up under the Act to advise the Minister for Health will include a member nominated by the Federal Council of the British Medical Association in Australia.

Abstracts from Medical Literature.

SURGERY.

Columnotomy.

G. RENES (*Arch. chir. neerl.*, 7: 3, 1955) discusses the use of columnotomy in the treatment of unreduced dorso-lumbar fractures with cord lesions after a preliminary laminectomy. He concludes from a series of thirteen cases that no definite proof can be given as to the value of this mode of treatment. However, five patients were "importantly" improved, two moderately, and two "unimportantly". Three patients remained unchanged, and one patient was slightly worse. Clinical improvement was dependent on the degree of reduction of flexion-angulation.

A Clinical Evaluation of Colon Cancer.

T. SHALLOW, F. WAGNER, JUNIOR, AND R. COLOHER (*Ann. Surg.*, August, 1955) have made a study of 750 patients with colonic cancer. They found an overall five-year survival rate of 33.1% with 94% of survivors still clinically free from cancer. Among the ideal cases (that is, those with localized lesions without evidence of spread) the five-year survival rate in the recto-sigmoidal and rectal group was 70.3%. The authors found that urinary tract infection accounted for the highest morbidity and renal failure for the highest mortality.

The Clinical Significance of the Ridge of Passavant.

R. T. BARTON (*Surg., Gynec. & Obst.*, September, 1955) describes the ridge of Passavant and comments on its importance to the clinician. The material used in the study was from 32 dissections of the nasopharynx and oropharynx as well as examinations made during numerous surgical procedures on the nasopharynx and the oropharynx. It is described as a transverse fold of the posterior pharyngeal wall, which develops during speech, swallowing, retching or vomiting, or whenever it is necessary to shut off the nose from the mouth. It is linear, pencil-sized in the adult and situated a few millimetres below the base of the uvula. It extends across the entire breadth of the posterior pharyngeal wall, including the raphe. Upon phonation, it is elevated to the level of the atlas. The author considers that those children in whom the ridge of Passavant has been interrupted with the adenotome during adenoidectomy experienced post-operatively a more prolonged period of nasality in their speech. The muscle responsible for the fold is almost exclusively the superior constrictor muscle of the pharynx. The function of the pharyngo-palatine muscle is important in the closing of the nasopharyngeal sphincter laterally, but its role in the formation of the ridge of Passavant is doubtful. The same is true of the salpingo-pharyngeus muscle. In the closure of the oro-nasal sphincter, the soft palate is pulled upwards and backwards almost in contact with the posterior

pharyngeal wall by the *levator veli palatini*. The fold at the same time buckles forward to meet the palate and close the space. It becomes obvious that it is not necessary for the proper action of the soft palate that it should be long enough for its edge to reach the posterior pharyngeal wall of the pharynx. Perfect control of the nasopharyngeal opening and consequently perfect speech are possessed by many in whom, owing to congenital defects or to surgical attacks on the tonsils and uvula, the palate is so short that its edge can never meet the back wall. The ridge of Passavant closes this hiatus.

The Surgery of Annular Pancreas.

M. J. TENDLER AND A. CIUTI (*Surgery*, August, 1955) state that since Ecker's article in 1862, over 90 cases of annular pancreas have been reported, with 60 surgically treated. The aetiological pathogenesis of annular pancreas is still somewhat obscure, but the theory of Lecco is at present the most favourably accepted by medical authors. The latter made a thorough study of the embryological development of the pancreas from two outgrowths. Macroscopically and microscopically, like the rest of the pancreas, the pancreatic ring may be completely normal. In some a chronic interstitial pancreatitis has been observed. The most common operative or autopsy finding has been that of duodenal obstruction, more or less marked, with dilatation of the proximal part of the duodenum. Compression of the common bile duct has been reported in some, others have reported the presence of gastroduodenal ulcerations. The clinical symptoms depend largely on the degree of obstruction. Complete duodenal obstruction, so marked as to necessitate surgery shortly after birth, reveals well the "double bubble" X-ray finding. Incomplete or moderate duodenal obstruction occurs with transient obstruction, and weeks or months of remission of symptoms between attacks. Radiological diagnosis here is most accurate during remissions. The authors describe two cases, one in a patient, forty-six years old, in whom cure was obtained by a duodeno-duodenostomy, and one in a twelve months old infant treated successfully with a duodeno-jejunosomy. The authors append in a table a summary of the 60 cases recorded in which the patients were surgically treated.

Intrathoracic Goitre.

W. FALOR, T. KELLY AND W. KRABILL (*Ann. Surg.*, August, 1955) point out that intrathoracic goitre may be considered as being of two main types: primary intrathoracic goitre, in which the vascular pedicles arise from intrathoracic arteries such as the aorta and drain into intrathoracic veins; secondary intrathoracic goitre, in which the blood supply arises from the inferior thyroid artery in the neck. They consider that the primary intrathoracic goitres arise in the thorax from ectopic, intrathoracic thyroid tissue, whereas the secondary goitres migrate from the neck, dragging their blood supply down with them. The authors point out that secondary intrathoracic goitres can be safely removed from the neck, as their blood supply can

be controlled by this route. On the other hand, the primary, the more rare type, must be removed via a thoracic approach, preferably a posterior lateral one through the bed of the fifth rib, as only then can the blood supply be controlled safely. The cervical portion of the gland is then removed via the cervical approach a week later.

The Removal of Scars and Tattoos.

J. J. ELLER (*New England J. Med.*, July 7, 1955) describes the technique of removing pitted scars due to acne, boils and smallpox and also of removing tattoos, certain naevi, keratoses and rhinophymas. Such abrasives as heatless stones, steel burrs, wire brushes and diamond and ruby fraises are used, set in rotary instruments driven at high speed by an electric motor. The best results are achieved with heatless stones driven at 30,000 revolutions per minute. These are easier to guide than instruments revolving 12,000 times per minute. The stones are easily kept clean and allow the operator to see the skin planed away layer by layer. Local or refrigeration anaesthesia is employed.

The Relief of Cardiac Ischaemia.

M. W. SELMAN (*Dis. Chest*, July, 1955) discusses the mechanisms of death in cardiac ischaemia, the discharge of abnormal electrical impulses from ischaemic parts of the heart muscle (the trigger mechanism), the mode of onset of ventricular fibrillation and the prevention of this by revascularization of the ischaemic muscle. He traces the evolution of the Beck operations for revascularization of the ischaemic heart, describes the technique of the Beck I operation, which he considers to be the best, and enumerates the contraindications. In the Beck I operation the coronary sinus is partially ligated, the pericardium and epicardium are abraded and sprinkled with asbestos powder, and a pedicle of mediastinal fat is applied to the heart. Among 31 patients operated upon there were no deaths and 22 excellent to good results; only four were unimproved. The operation does not affect the coronary arterial disease and cannot restore degenerated myocardium.

By-Pass of the Pulmonary Valve.

T. J. DONOVAN AND J. F. DONOVAN (*J. Thoracic Surg.*, July, 1955) have made post-operative studies of animals one year and three years after permanent ligation of the pulmonary artery and total by-pass of the pulmonary valve through an extracardiac shunt. The shunt, of plastic tubing and venous homograft, connected the right ventricle to the pulmonary artery just distal to the ligature. Despite the absence of a valve in the shunt, it was tolerated well. The authors discuss the relevance of this research to congenital cyanosis of cardiac origin.

Surgical Treatment of Heart Block.

C. P. BAILEY AND W. LIKOFF (*Dis. Chest*, May, 1955) report the cure of heart block in a man aged thirty-six years by the construction of an artificial bundle of Kent. A portion of the wall of the right atrium was excluded from the

circulation by a non-crushing clamp technique. The elongated, excluded segment was then separated from its atrial attachment except at one extremity. The residual defect in the atrial wall was closed by sutures. A selected portion of the right ventricular wall was split, and the epicardial portion was elevated. After freshening both its epicardial and endocardial surfaces, the end of the pedicled atrial tissue was sandwiched between the two layers of the ventricular wall and sutured. On the sixth day after operation an almost normal type of atrio-ventricular conduction developed, and the ventricular pulse rate rose from 50 to 82 beats per minute. The electrocardiogram showed a PR interval of 0.12 second and fairly normal QRS complexes.

Hollow Chest.

P. F. HAUSMANN (*J. Thoracic Surg.*, June, 1955) reports the surgical cure of hollow chest (funnel chest) in 51 patients without operative mortality. Only 10 of the patients were over the age of five years; the oldest was twenty-nine years of age. All the deformed costal cartilage was removed by subperichondrial resection, and the sternum was brought forward to its normal position. Regeneration of the rib cartilages occurred quickly, and stability of the chest wall returned in ten days or so.

Outlining the Thoracic Duct.

K. MERRILL (*J. Thoracic Surg.*, May, 1955) describes the successful use of a dye, Evans blue, to render the thoracic duct easily visible during surgical operations either upon it or in its vicinity. The dye, in a 1% aqueous solution, is injected subcutaneously into a lower limb and appears in the duct in a few minutes. The dose recommended is 0.7 to 0.8 milligramme per kilogram of body weight; but a dose of 25 milligrammes should not be exceeded because of the possibility of deep, widespread staining of the patient's skin.

Excision of a Cardiac Aneurysm.

C. P. BAILEY (*Dis. Chest*, May, 1955) reports the surgical excision of an enlarging aneurysm of the antero-lateral wall of the left ventricle. The patient was a man, aged fifty-six years, suffering from persistent angina and congestive heart failure. A large non-crushing clamp was applied across most of the poorly demarcated base of the aneurysm, and, after the placement of two rows of mattress sutures, the sac was excised and the cut edges of the myocardial wound were approximated with running sutures. Convalescence was uneventful, and marked clinical improvement ensued and persisted.

Cystic Duct Remnant after Cholecystectomy.

F. GLENN AND G. JOHNSON, JUNIOR (*Surg., Gynec. & Obst.*, September, 1955) state that a cystic duct remnant is the result of inadequate cholecystectomy and may cause symptoms indistinguishable from gall-bladder disease. It is one of the causes of the so-called post-cholecystectomy syndrome. Intravenous cholangiography is a valuable adjunct in demon-

strating evidence of this disease. They point out that careful technique will avoid this mishap.

Segmental Resection and Oesophageal Carcinoma.

E. SCANLON, D. MORTON, J. WALKER AND W. WATSON (*Surg., Gynec. & Obst.*, September, 1955) report that in a study of a series of 79 patients who had had segmental resection of the oesophagus for epidermoid carcinoma, 45.6% of the patients had had an inadequate segmental resection of the oesophagus as shown by early recurrences at the site of operation. They state that there may be microscopic invasion of carcinoma cells in tissue that appears macroscopically normal.

Juxta-Oesophageal Gastric Ulcer.

J. BRASCH, J. CAIN AND J. PRIESTLEY (*Surg., Gynec. & Obst.*, September, 1955) have reviewed a series of 50 cases of surgical treatment of gastric ulcers located within two inches of the oesophageal-gastric junction. They comprised 5% of all gastric ulcers for which operation was performed at the Mayo Clinic from 1940 through to 1946. They did not differ appreciably from other gastric ulcers with regard to age, sex or symptomatology. They were best localized by X-ray examination. Gastroscopy was of little use in these instances. The ulcers were usually situated on or near the lesser curvature. The majority were therefore treated by partial gastrectomy with removal of the ulcer. The results were good. When the ulcers were extremely close to the oesophagus, the authors found that biopsy (to exclude carcinoma) and distal partial gastrectomy or even gastroenterostomy gave better results than total gastrectomy or oesophago-gastrectomy.

Cholecystitis and Cholelithiasis.

B. COLCOCK AND J. McMANUS (*Surg., Gynec. & Obst.*, August, 1955), after experience with 1356 cases of cholecystitis and cholelithiasis, came to the conclusion that if patients with gall-stones were advised to have their gall-bladder removed when the calculi were discovered, before complications developed and before they entered the older age groups, the mortality and morbidity of biliary tract disease would be improved.

Thyroid Carcinoma in Children.

T. WINSHIP AND W. CHASE (*Surg., Gynec. & Obst.*, August, 1955) conclude, as a result of the study of data of 285 cases of childhood thyroid carcinoma, that this disease in children is no different from that occurring in adults, whether in clinical manifestations, histological types or progress.

The Importance of Technique in Cholecystectomy.

F. GLENN (*Surg., Gynec. & Obst.*, August, 1955) points out that operations on the biliary tract are amongst those most commonly performed nowadays. He states that surgeons must strive to prevent injury to the common duct and

must not leave a remnant of the cystic duct. He describes his technique of cholecystectomy. This involves individual identification and dissection of the cystic duct and the cystic artery with temporary ligation of the latter, followed by removal of the gall-bladder from the fundus toward the cystic duct. The unequivocal demonstration of the junction of the cystic duct and the common duct is a necessary part of the safe operation.

Serum Amylase Concentration in Acute Perforation of Gastro-duodenal Ulcers.

J. MAHAFFEY, H. BROCKMAN, G. JORDAN AND J. HOWARD (*Surg., Gynec. & Obst.*, August, 1955) made a pre-operative serum amylase determination in 51 cases of acute perforation of gastro-duodenal ulcers. Eight of the patients had values above normal levels. As a result, the authors conclude that this finding can never be absolute in the differential diagnosis between acute pancreatitis and a perforated peptic ulcer.

Diagnosis of Orthopaedic Lesions by Aspiration Biopsy.

C. E. OTTOLENGHI (*J. Bone & Joint Surg.*, June, 1955) states that in order to ascertain the nature of an osteo-articular lesion in which diagnosis is doubtful clinically and radiographically, it is necessary to examine the lesion directly, and he advocates the use of aspiration biopsy. The method is simple, and the patient is not submitted to any risk. As the aspiration needle penetrates the lesion, aspiration can be carried out at various levels. By aspiration, deep areas of the skeleton can be reached, which would otherwise be accessible only by a major surgical operation. Such procedures, if undertaken only for diagnosis, would be unacceptable to patients. Aspiration biopsy offers no disadvantage to the patient who must later submit to an operation. Aspiration biopsy does not interfere with X-ray therapy if this treatment is later found necessary, since the skin lesion from the slight puncture with a scalpel is minor. Aspiration biopsy does not exclude open biopsy. The greatest drawback is the small amount of material withdrawn. It is necessary for the pathologist to be experienced in examination of this material. The author has found that aspiration biopsy is a method by which a high percentage of accurate diagnoses may be obtained, provided that the correct technique is followed and the material is examined by specialized pathologists. Of 1061 aspiration biopsies carried out in 998 patients, the results in 895 cases were positive, in 45 doubtful and in 121 negative; in 49 cases punctures were repeated because insufficient material was obtained from the first puncture and it was desired to confirm a diagnosis. The author believes that aspiration biopsy is particularly useful in deep locations such as the vertebral bodies and the pelvis. Aspiration biopsy of vertebral bodies may be considered as a definite advance because of its simplicity and safety and become an accepted method of diagnosis. By diagram the author points out that the first to the tenth dorsal vertebral bodies are not suitable for puncture.

Special Articles.

INFECTIOUS HEPATITIS.

(CONTRIBUTED BY REQUEST.)

THE present epidemic of infectious hepatitis is rightly receiving considerable attention because the more attention that can be given to a disease spread by dirtiness, the more chance there is of preventing future epidemics. Outbreaks of hepatitis have been common for centuries—one was described twelve hundred years ago by the Pope, and this ancient history should make us pause to consider how little progress we have made in preventing epidemics of communicable diseases in peacetime, especially those whose transmission is related to poor personal and public hygiene.

Epidemiology.

Acute infectious hepatitis, catarrhal jaundice, epidemic hepatitis or epidemic jaundice is a form of hepatitis caused by a filterable infectious agent, presumably a virus. It is closely related to serum, syringe or post-transfusion hepatitis. It occurs sporadically and in epidemics with an incubation period of two to six weeks, in contrast to serum hepatitis, which has an incubation period of two to six months.

The infecting agent has not been demonstrated in the naso-pharyngeal secretions or in the urine, but it is present in the blood and faeces. Patients may be infectious before, during and for many months or years after the acute attack. Symptomless carriers are not rare and are important disseminators of the disease.

The route of infection is intestinal. Faecally contaminated hands, water, milk and food are the common vehicles of transmission. Carriers are most important, as they are undetectable.

One attack confers lasting immunity, but there seems to be no cross-immunity between acute infectious hepatitis and serum hepatitis.

For obvious reasons epidemics are especially prone to occur in institutions and communities living in close contact without adequate hygiene.

Clinical Features.

The chief incidence is in children and young adults, though no age group is immune. It is unnecessary to detail the classical clinical picture of acute infectious hepatitis with its pre-icteric stage of anorexia, fatigue, distaste for tobacco and alcohol, abdominal discomfort and malaise, and its icteric stage with symptomatic improvement. Chills and fever are common in the earlier stages, jaundice may be the presenting feature but may be absent, aches and pains in the limbs, transient lymphadenopathy, rashes and severe headache may all occur. Pruritus is uncommon, occurs with the onset of jaundice and lasts only a few days. Bleeding phenomena are uncommon, but may be severe and confuse the diagnosis. The early gastro-intestinal symptoms may closely mimic peptic ulcer, both in the time of the onset and nature of the pain and in the relief of pain by alkali.

In the average case dark urine is an early sign, and careful testing with Fouchet's reagent (or the tablet test) reveals the presence of bilirubin, often before jaundice is detectable. The iodine test is far too crude to disclose this early bilirubinuria (Sherlock). Urobilinogen appears in the urine in increased amounts early in the disease. In the icteric phase the stools are pale, and a return of colour is a sign of recovery as a rule.

Tenderness of the liver, especially pain on jarring the right lower part of the chest wall, and the presence of bilirubin in the urine are the key signs of the disease.

Biochemical tests, such as the determination of the serum bilirubin and alkaline phosphatase levels and the flocculation and bromsulphthalein retention tests, are all of considerable value in the doubtful case and help in the assessment of the changes taking place in the patient having a prolonged course. The results of flocculation tests may take many weeks or months to return completely to normal, abnormal results persisting long after the clinical evidence of activity has disappeared; these circumstances do not occasion alarm, but rather suggest continued follow-up. If there is evidence of continued activity of the disease, as suggested by persistently positive results of flocculation tests, it is desirable

to estimate the bromsulphthalein retention and to have a needle biopsy of the liver carried out before allowing full activity.

Acute non-icteric hepatitis is common and presents as a gastro-intestinal disorder, especially in children. The presence of liver tenderness, of an epidemic, of a history of significant contact and of positive results from liver function tests all assist in the making of the diagnosis; but as all of these phenomena may be absent, except for tenderness over the liver, which is not specific, the chief means of making a diagnosis is by clinical awareness. In these cases the patients correspond to those with non-paralytic poliomyelitis and are just as likely to become carriers as are the icteric patients.

Transplacental infection of the foetus has been described, but the majority of mothers who have acute infectious hepatitis in pregnancy are delivered of normal children. Neonatal infection is not rare, and it must be remembered that the infected mother may have had no history of her anicteric attack. It is possible that congenital malformation may be more frequent in children of mothers having hepatitis during pregnancy, but no conclusions can be reached regarding this important aspect of the disease.

Diagnosis.

In an epidemic the diagnosis is usually easy, and the errors are likely to be on the side of considering a patient with stone or carcinoma of the pancreas to have infective hepatitis. Diagnosis is primarily clinical and should be suspected in the pre-icteric stage, when tenderness over the liver and dark urine due to slight bilirubinuria occur in a patient with malaise and gastro-intestinal symptoms.

The value of the "liver function tests" is undisputed, but they are not usually necessary to make a diagnosis of acute infectious hepatitis. These tests indicate a type of liver disease, but not what it is. They are especially useful to determine progress and activity of the disease, but the average patient can be managed clinically if attention is paid to the liver, to jaundice, to symptoms and to the urine.

In the differentiation of obstructive jaundice due to stone or pancreatic lesions, the presence of strongly positive results from flocculation tests in the early stages suggests infectious hepatitis, as does a small rise in serum alkaline phosphatase content in the presence of severe jaundice.

The results of flocculation tests are very rarely all negative in adults with infectious hepatitis, but this is not an uncommon finding in young children. The most sensitive tests at all stages are the bromsulphthalein retention and the zinc sulphate turbidity tests, and determination of the serum bilirubin level. They are of real value in patients with prolonged symptoms, because it is highly improbable that a patient with persistently negative biochemical findings will develop chronic progressive hepatitis and cirrhosis.

The absence of any history of contact in no way lessens the probability of infectious hepatitis, because so many carriers are symptomless.

Infectious mononucleosis may be difficult to distinguish, because there may be jaundice in this malady, and both cervical lymphadenopathy and the presence of abnormal lymphocytes have been described in acute infectious hepatitis. The course of the disease, the degree of jaundice, the extent of lymphadenopathy, the Bunnell-Paul test and liver function tests help to differentiate in the difficult case.

Anicteric patients present major diagnostic problems, and in the absence of positive results from liver function tests a liver biopsy may be the only way to make a positive diagnosis; this, however, can hardly be recommended as a routine. The diagnosis is usually clinical.

Course and Complications.

General and gastro-intestinal symptoms decrease with the onset of jaundice in most cases, so that symptoms are often minor when jaundice is at its peak. After two weeks the average patient feels reasonably well, except for lassitude, but liver tenderness and enlargement tend to persist for longer; indeed, liver tenderness may outlast jaundice.

The vast majority of patients with acute infectious hepatitis make a complete recovery; and as few anicteric cases are recognized, estimates of the incidence of complications all tend to be higher than is really the case. A fatal outcome has been reported to occur in one or two cases in each 1000. Some factors tending to lead to death are older age and the presence of other diseases, especially of the liver; other relevant factors are the general health of the patient, the strain of the virus, perhaps the size of the infecting dose

and the management of the patient. Death occurs in the fulminant case quite early, but in subacute cases it may be delayed for several weeks and occur in a sudden relapse or in the gradual progression of the disease. Death usually occurs from hepatic failure with coma.

Relapses.—Relapses are common in both the icteric and the non-icteric forms, and have been estimated to occur in about 20% of cases; they commonly occur when the patient returns to activity. Probably 95% of relapsing patients make an ultimate complete recovery. Relapses should be treated in exactly the same manner as the acute primary attack.

Prolonged Hepatitis.—Prolonged hepatitis, lasting for more than four months, is not rare. Neefe suggests that 15% to 20% of acute cases may fall into this group, but in 95% of cases the patients completely recover within eighteen months. Improvement is gradual, and jaundice, fatigue and biochemical abnormalities are characteristic. Liver biopsy may be needed to make a correct diagnosis if there has been no typical acute attack. Management of these patients is difficult, and restriction of activity is recommended until the patient is well and jaundice has disappeared.

Progressive or Chronic Hepatitis.—Progressive or chronic hepatitis is the result of persisting disease with continuing damage to the liver, which commonly leads to death from hepatic failure or one of the complications of cirrhosis. In some patients the condition does become quiescent and stabilized with decreased hepatic functioning tissue, and presents the clinical picture of relatively inactive cirrhosis. The progress of this form of hepatitis covers a few years, and it is not possible early in the course to predict the degree of hepatic function which will be remaining in a given time. The incidence appears to be about three to six per 1000 cases and follows both the icteric and non-icteric acute attacks; indeed, the acute attack may be entirely missed by the patient and the doctor. This form of the disease is commonly lethal; it is treated by prolonged rest, by adequate diet, and by trial administration of ACTH or cortisone, which is sometimes of benefit.

The Post-Hepatitis Syndrome.—Some patients continue to have minor symptoms of anorexia, fatigue and abdominal discomfort after recovering from acute hepatitis. These patients do not have altered results of liver function tests or continuing disease but psychosomatic illness. This group of patients must not be confused with those who have "biliary" discomfort for a few weeks in the latter part of convalescence, a common and insignificant phenomenon.

Prognosis.

The vast majority of patients with hepatitis make a complete recovery without microscopic or biochemical evidence of residual hepatic damage. The average young adult with uncomplicated icteric hepatitis will be well in six weeks and will rarely be off work for more than three months. A prolonged course or the development of a relapse increases the chances of failing to make a complete recovery, but there is very little difference in ultimate prognosis in these circumstances.

Severe hepatitis in patients of the older age group, in patients already ill from other disease, in those with cirrhosis, and in debilitated ill-nourished persons may have a mortality far higher; indeed, a figure of 10% to 20% has been quoted.

It is important to emphasize the fact that the prognosis cannot be judged by the initial severity of the acute attack, or by the absence of jaundice; this refers to an acutely fatal outcome as well as to a liability to develop progressive hepatitis.

Prevention and Prophylaxis.

Prevention means prevention of contact with the infecting agent, which means, quite baldly, the prevention of faecal material from reaching the mouth. This implies the prevention of faecal contamination of fingers and food, the washing of hands and all the measures designed to prevent the spread of intestinal pathogens—that is, perfect hygiene. It is obviously desirable to avoid close and unnecessary contacts during an epidemic, because every person is a potential carrier.

As the virus is present in the blood, very great care should be used in all syringe work; and an epidemic of hepatitis provides yet another reason for being quite certain that blood transfusion is absolutely necessary.

Prophylaxis by the administration of 0.01 millilitre of γ globulin per pound of body weight is of real value in

reducing the incidence of clinical disease. It is not of value after the onset of the disease. It is desirable to give γ globulin to all persons exposed in a spreading epidemic in institutions or in closed communities living in close contact and to those heavily exposed in any circumstances.

Patients treated in hospital are managed with the same strict precautions as are adopted for poliomyelitis, but those treated at home need not be isolated from close members of the family, as these have probably been exposed by the time the disease presents. Nevertheless, advice must be given to other members of the family, and to the patient, regarding strict personal and family hygiene.

Treatment.

Rest in Bed.

Bed rest is indicated for all patients, whether jaundiced or not, in the acute phases of the disease, and patients should be so confined at least till they are clinically no longer ill. It is common practice to keep patients at rest until significant tenderness and enlargement of the liver have subsided. The precise duration of bed rest varies from patient to patient and, in general, is more prolonged in severe cases and in patients over forty years of age. It is common, and good practice, to keep patients at rest till they feel well and have no significant signs, and jaundice has disappeared or is minimal. Although recent publications have suggested that bed rest may be of little value, it is well to remember that relapses during convalescence frequently occur after exertion or alcoholic excess, as was noted so often in the Australian Army in the Middle East and elsewhere. It must be reemphasized that it is impossible to judge the course and outcome of acute infectious hepatitis by the presentation and severity of the acute attack.

Convalescence.

Convalescence should be gradual, and patients who are over forty years of age, who have had severe attacks, or who have had prolonged symptoms should be warned to avoid excessive exertion and alcohol for six months or more. It is important to avoid excessive restriction, as the "iatrogenic post-hepatitis syndrome" is common.

Diet.

A nutritive diet of high protein content is the best, and fat should be restricted only if the patient is nauseated by it, a not uncommon complaint. During the first few weeks or months after recovery from an acute attack some patients complain of discomfort in the right hypochondrium which they relate to their liver or gall-bladder; this is not of significance in the absence of other clinical signs and may often be prevented by dietetic alterations.

Drugs.

No drugs appear to be of significant value, and the side effects of the broad-spectrum antibiotics outweigh their recorded benefits.

ACTH and Cortisone.

ACTH and cortisone are not indicated in acute hepatitis, and there is some evidence that relapses are more frequent in patients so treated. They should be reserved for patients with very severe hepatitis or hepatic coma, for then they may be of benefit.

Symptomatic Measures.

Anorexia and Nausea.—Anorexia and nausea, which are often severe, may be relieved by "Benadryl" or "Marzine". Chlorpromazine has been reported to cause hepatic failure and is contraindicated. When anorexia and nausea are sufficiently severe, an infusion of 10% dextrose solution may be needed each day. In such cases vitamin supplements are always given.

Pruritus.—Pruritus may be very troublesome for a few days and prevent sleep. This symptom may be relieved by antihistaminics or small doses of pilocarpine; in a rare case intravenous administration of papaverine may be used. Great caution should be used before giving ergotamine, because serious accidents have occurred in patients with liver disease given this drug; doses should not be repeated with the frequency used for migraine.

Insomnia.—Barbiturates may be used for insomnia, but it is wise practice to give lower than average doses until the

effects have been noted. "Amytal", "Nembutal" (pentobarbital) and "Seconal" are mainly degraded by the liver and may have a much greater effect than anticipated. Phenobarbital is excreted by the kidney in part and is safer to use.

Lipotropic Agents.—Lipotropic agents are without value unless the patient has significant nutritional deficiencies, and then these agents (choline, methionine, inositol) are not needed if the patient takes an adequate diet. The routine administration of massive doses of vitamin B₁₂ is not recommended as being of significant value.

Follow-Up.—It is desirable to see the recovered patient at intervals of a month at first and then at longer intervals for a year, especially if there has been evidence of persisting infection, to detect any early evidence of smouldering infection.

Conclusion.

In conclusion, stress must be laid on the transmission of the disease by fecal contamination, on the importance of the symptomless carrier, on the recognition of the anicteric patient, who is likely to spread the disease and to have all the complications of the icteric patient, on the need to treat all patients with rest until the course of their disease becomes clear, on the ineffectiveness of antibiotics, lipotropic agents and, in general, the hormones, on the fact that half or more of the infected patients are symptomless and on the excellent prognosis for the majority, but not all, of the patients with acute infectious hepatitis.

C. R. B. BLACKBURN,
Sydney.

Out of the Past.

In this column will be published from time to time extracts, taken from medical journals, newspapers, official and historical records, diaries and so on, dealing with events connected with the early medical history of Australia.

NATIVE FRUITS.¹

[From "An Historical Journal of the Transactions at Port Jackson and Norfolk Island", by John Hunter, Esq., Port Captain in His Majesty's Navy, London, 1793.]

November, 1790.

SEVERAL fruits peculiar to the country are now in season: that which was supposed to be the fruit Captain Cook calls a cherry, the natives call *mizobooore*: the taste of it is insipid, and it differs little from another fruit similar in its appearance, but something smaller, and which, as well as the former, is found in great abundance: there is likewise a third sort, which differs as little in appearance and taste. Though there is little variety either in the shape or taste of the fruits just mentioned, yet, it is very remarkable that the trees on which they grow are of very different kinds. The fruits or berries, just mentioned, have so insipid a taste, that they are held in very little estimation by our colonists: but that is not the case with the acid berry, which is about the size of a currant, and grows on a tree the leaves of which resemble the broom. The acid of this fruit, even when ripe, is very strong, and is perhaps the purest in the world: it is pleasant to the taste and Governor Phillip found it particularly so, when on a journey in hot weather: the surgeon held it in great estimation as an antiscorbutic; and with a large proportion of sugar it makes excellent tarts and jellies. There is also another fruit, which, when ripe, is of a transparent red colour, about the size of a currant and shaped like a heart: it has an agreeable flavour, leaving an astringency on the palate, and cannot be otherwise than wholesome, as the settlers had ate great quantities of it at times without any pernicious consequences.

There is likewise a nut, which had violent effects on those who ate it unprepared: the natives soak it in water for seven or eight days changing the water every day; and at the expiration of that time they roast it in the embers: but the kernel is taken out of the hard shell, previous to its being put into the water: it is nearly equal to the chestnut in goodness.

¹ From the original in the Mitchell Library, Sydney.

Correspondence.

THE REGISTER OF MEDICAL PRACTITIONERS FOR NEW SOUTH WALES.

SIR: The New South Wales Medical Board is required by law to make such alterations and amendments in the Register of Medical Practitioners for New South Wales as may be necessary to make it "an accurate record of the names, addresses and qualifications of all persons for the time being registered". The edition of the Register recently published (curiously dated "1954 and 1955") is a great improvement on its predecessors as regards accuracy. The annual roll fee instituted in 1954 has put the Board in touch ("touch" is the word) with every practising doctor once a year, and the opportunity has been taken to revise the registered addresses—for the first time in many years, I believe.

The large and assured income derived from the roll fee makes it easy for the Board, if it should so desire, to render a further public service. It could well afford to waive the fees now charged for the registration of additional qualifications. A small amendment to the Act might be necessary to enable it to do so. If this were done, many doctors, of whom I have been one for the last twenty years, who are reluctant to pay the Board a fee to carry out its statutory duty to keep the Register accurate, might be encouraged to cooperate with it. Meanwhile, if one wants to know a doctor's qualifications, one still looks them up in the Medical Directory, not in the Medical Register.

Yours, etc.,

185 Macquarie Street,
Sydney,
January 31, 1956.

DOUGLAS ANDERSON.

THE BRITISH MEDICAL ASSOCIATION AND ITS MEMBERS.

SIR: Dr. Munro Alexander draws attention (M. J. AUSTRALIA, January 7, 1956) to the apparent inertia of members of the Association and their indifference in general to its activities, except when their income is likely to be affected, but this is an old story. It is, however, particularly unfortunate at present, when the increasing scope of the Association's activities and its status in the life of the community make it essential that more and more of its members should take an intelligent interest and participate fully in its affairs.

As a member of forty-five years' standing who has been in close touch with most of the activities of the Association, its members and officers, I realize how great a debt is owed to those who have successfully guided it through the various crises which have faced it in recent years, and it may well be that as Dr. J. R. Sands suggests (M. J. AUSTRALIA, January 28, 1956) the apparent lack of interest on the part of members is due to their confidence in their representatives on various councils and committees. But a good deal of credit is due elsewhere.

The rapid increase in membership, particularly since the conclusion of the recent war, has imposed a serious burden on the Association's permanent staff, of which the more recent graduates in particular may not be fully informed. Presidents come and go, councillors vary in the length of their terms of office, and efficient continuity of service depends more and more on the medical secretariat and the senior lay staff of the Association's office.

Dr. J. G. Hunter has given twenty-seven years of devoted service as Medical Secretary, a position for which he has very special qualifications; he has never spared himself—frequently to the detriment of his health. For the past twenty-three years he has also been General Secretary of the Federal Council of the Association. His long experience, profound knowledge and the overseas contacts which he has been able to establish have been of inestimable value to Australian medicine, both in conference and in the maintenance of amicable public relations.

For the past ten years he has had loyal support from Dr. Hugh Hunter.

Miss H. Cameron, managing clerk, has been with the Association for twenty-eight years; she is also Executive Secretary of the Federal Council, and in both capacities has

worked most efficiently and unsparingly with a singular disregard of self-interest.

The willing helpful assistance given to members for twenty years by Miss M. Rolleston in the rapidly expanding medical library is too well known and generally acknowledged to require any comment. Miss M. Clark has also for twenty years given loyal efficient service in the office.

The valuable contribution of this staff work towards the smooth running and efficient working of the Branch office is recognized and appreciated by most of the "inner circle", but is not widely known amongst the large body of members whose main contact with the Association is the payment of their annual subscription. The prestige of the New South Wales Branch both throughout Australia and with the Parent Body in London, where it stands very high, is in no small degree due to this continued devotion to duty in positions which earn many kicks, but no superabundance of halfpence.

Dr. Alexander does well to draw attention to the paucity of attendance at meetings and in particular to lack of interest in the annual election to the Council, now impending. It is essential that all sections of the profession and all age groups should be represented on the Council, who will apply themselves to their task with the greater confidence if they can feel that they represent a true cross-section of the profession rather than a comparative minority.

Yours, etc.,

A. M. McINTOSH.

Sydney,
February 6, 1956.

SIR: Following the letters of Dr. Munro Alexander and Dr. Sands, may I make some comments about the responsibility of the women graduates in medicine towards the Association?

The elections are approaching and nominations close on February 29. Last year, through lack of interest, there was no nomination for a representative of the women graduates on the Council. This was a great shock to many of us and a cause for comment amongst the men, who felt that we were indolent and did not wish to have representation. On inquiry it was revealed that many of us were under the same misapprehension as myself. We thought that the nomination had to come from the Medical Women's Association. This is quite wrong—any woman can be nominated by any two members of the Branch. There are at present 437 women graduates eligible to vote at the Council election—for many of the pioneers, a dream come true. May I urge the women to avail themselves of their privilege and see that not one, but several, suitable candidates willing to apply themselves to the task are nominated?

Our future in medicine depends on the decisions of the Council which we elect, and we should all like to see elected a better representation of age groups. Rumours are abroad that many of the present Council seem to be unaware of the problems encountered by the practitioners, also that they are allowing many side issues to interfere with the transaction of Council business, the purpose for which they were elected. It is time that we were informed of these matters which have been distracting the attention of the Council since August, 1955. If they are unable to find a solution, then why not call a Branch meeting and allow the members to help them to prevent the whole fabric of our Branch from being torn asunder?

Medical women, awake! At least shoulder your responsibilities in this matter.

Yours, etc.,

M. NAOMI WING.

235 Macquarie Street,
Sydney,
January 6, 1956.

COMPLICATIONS OF VACCINATION.

SIR: An adult male was given a primary vaccination on the left arm, because he was going abroad. The following complications occurred. He developed *herpes simplex* three times in two weeks, the eruption occurring in different sites involving the chin and around the mouth. He also had *herpes zoster* affecting the area of skin served by the eleventh dorsal nerve, with numbness along the course of the nerve, also red spots and several vesicles. Using a tuning fork to test vibration sense, it was noted that the vibration was felt in the affected area for a shorter period of time than in the corresponding area on the opposite side;

when the vibrations could no longer be felt on the right (affected) side, they could still be felt on the left side. However, there was tenderness in the area served by the nerve on the right side. The lymphatic glands in the groin on the right side were tender, and there was tenderness also in the right lower abdomen. There was also a degree of general malaise. Dysphagia occurred for a week.

The vaccination was performed on January 4; the numbness began on January 22. The paræsthesia occurred subsequently; and after this disappeared, the lesions occurred.

The writer has also seen two cases who had suffered from cowpox, in whom primary vaccination was performed in early adult life. The pocks were on both hands. Vaccination was unsuccessful, the persons being immune.

Yours, etc.,

S. J. CANTOR.

New Norfolk,
Tasmania,
February 2, 1956.

A CASE OF ATTEMPTED SUICIDE WITH ISONICOTINIC ACID HYDRAZIDE.

SIR: In view of the widespread use of isoniazid and of its freedom, in therapeutic dosage, from toxic symptoms the report of Dixon and Woodforde (M. J. AUSTRALIA, January 7, 1956, page 17) of a suicidal attempt with this drug is of considerable interest. A fatal case of isoniazid poisoning is reported in the "Quarterly Progress Report of the Veteran Administration-Army-Navy Study on the Chemotherapy of Tuberculosis", Volume X, Number 3, October, 1955, page 66, from the San Fernando V.A. Hospital, California, 650 microgrammes per millilitre being found in the patient's blood, the amount ingested being estimated at "a bottle full of tablets".

Yours, etc.,

ELLIS W. ABRAHAM, M.D., M.R.C.P.,
Director of Tuberculosis.

Department of Health and Home Affairs,
Brisbane,
February 2, 1956.

Medical Societies.

THE MEDICAL SCIENCES CLUB OF SOUTH AUSTRALIA.

A MEETING of the Medical Sciences Club of South Australia was held at the New Medical School, Frome Road, Adelaide, on November 4, 1945.

Phalaris Staggers.

Three short films were shown depicting acute phalaris staggers in sheep, acute phalaris staggers in cattle and chronic phalaris staggers in sheep.

H. J. LEE and R. E. KUCHEL, in a paper, said that phalaris staggers was a frequently fatal disease that affected sheep and cattle under some circumstances when they grazed pastures in which the freshly growing perennial grass *Phalaris tuberosa* predominated. It had been postulated that an unknown toxic principle in phalaris was responsible for the disease, which had occurred in most, but not all, of the areas in Australia where *Phalaris tuberosa* was grown, and had been reported also in New Zealand.

The symptoms had been ascribed to nervous degeneration in the brain and spinal cord, but difficulty had been experienced in providing confirmation from recently collected experimental material.

Recent work had shown that the disease might be prevented (but not arrested or cured) specifically by adequate and sufficiently frequent oral doses of cobalt; other metals had no effect. It was also evident that the dilution of phalaris by other palatable pasture species might reduce the consumption of phalaris to a point where the toxic material might be safely metabolized.

The incidence of phalaris staggers in any one area varied from season to season, and that might be due to variations in (a) the toxicity of phalaris, (b) the botanical composition of the pastures, or (c) the cobalt concentration of the plants. Answers to those and many other possibilities must await the chemical identification and assay of the toxic principle.

It had been shown that cobalt administered parenterally had no protective effect and therefore that it must function within the rumen. The only known function of cobalt within the rumen was in the elaboration of vitamin B_{12} and it was at first assumed that cobalt functioned in phalaris staggers by ensuring the production of sufficient vitamin B_{12} to detoxicate the deleterious material present in the phalaris. It had now been proven, however, that vitamin B_{12} had no effect on the incidence of staggers, and alternative explanations for the function of cobalt were being sought.

Possible Relation of Basal Metabolism to Protein Turnover.

E. W. L. LINES, in a paper on the possible relation of basal metabolism to protein turnover, said that protein turnover in mouse, cat, dog and man bore to body weight a similar relation to that of energy metabolism. As had been shown previously, the housekeeping activities of liver, heart and kidney accounted for 50% of basal metabolism; brain used another 20%; thus the remaining 30% must take care of respiration, visceral activity and muscle tone, leaving only a small fraction to sustain the fundamental activity which acted as "pacemaker" for the whole. The parallelism of protein synthesis (as determined by isotopic techniques) and energy metabolism suggested that such synthesis was closely related to the fundamental "pacemaker". If one quantum of biological energy (1 ATP) was needed for each amino acid converted to protein, the energy needed would be around 2% of the total basal output, so that direct measurement would be difficult. The enhanced metabolism of juveniles—after correcting for their body weight—paralleled the more rapid turnover of protein suggested by their enhanced powers of recovery from stress or repair of trauma.

When dogs were placed in positive protein balance by injections of pituitary growth hormone, their protein turnover increased. A similar effect in the quickly growing animal would make its protein turnover parallel its enhanced metabolic rate. The enhanced basal metabolism in hyperthyroidism would seem to arise from increased protein breakdown evoking a higher rate of synthesis.

AUSTRALASIAN CARDIAC SOCIETY.

The annual meeting of the Australasian Cardiac Society will be held at the Nurses' Preliminary School, Wellington Hospital, New Zealand, on March 26 and 27, 1956. The programme is as follows:

Monday, March 26: 9.30 a.m., annual general meeting; 10 a.m., "Subendocardial Infarction: An Autopsy and Electrocardiographic Study", Dr. E. H. Roche; 10.30 a.m., "Hemodynamics of Constrictive Pericarditis", Dr. B. Sinclair-Smith, Dr. K. Cotton and Dr. J. K. Maddox; 11.30 a.m., "The Circulatory Effects of Rauwolfia Alkaloids, Experimental and Clinical", Dr. E. G. McQueen; 12 noon, "Anomalies Associated with Aortic Coarctation", Dr. B. Huxtable; 12.20 p.m., "Coarctation of the Aorta: A Clinical and Post-Operative Study", Dr. Rowan Nicks; 2.30 p.m., "The Diagnosis and Choice of Surgical Treatment in Some Less Common Forms of Cyanotic Congenital Heart Disease", Dr. J. B. Lowe; 3 p.m., "Electrocardiographic Changes following Acute Blood Loss and Their Response to Trinitrin", Dr. Ian Prior; 3.30 p.m., "Malignant Carcinoids and Pulmonary Stenosis", Dr. David Hay.

Tuesday, March 27: 10 a.m., "Some Aspects of Aortic Stenosis", Dr. John Halliday; 10.20 a.m., "Surgical Approach to Aortic Stenosis", Dr. Douglas Robb, C.M.G.; 11.30 a.m., further discussion of aortic stenosis; 2.30 p.m., demonstration of clinical cases, arranged by Dr. C. R. Burns.

All Fellows and Members of the Royal Colleges are invited to attend these meetings.

Public Health.

SCHOOL HEALTH SERVICES IN QUEENSLAND.

The School Health Services in Queensland are discussed in the annual report of the Health and Medical Services of that State for the year 1954-1955. The report is presented

by Dr. A. Fryberg, the Director-General of Health and Medical Services. The section of the report dealing with School Health Services comes from the pen of Dr. P. R. Patrick, Chief Medical Officer of the Division. In addition to the Chief Medical Officer, the Division has one full-time medical officer stationed at Brisbane and another at Townsville; there is a part-time school medical officer at Ipswich. There is a chief dental inspector, who has 14 full-time dental officers under his control. There is one part-time dental officer. The Division employs one senior sister and 22 school sisters. The senior sister and six of the sisters work in Brisbane and 17 in country districts. The nurses are trained in Brisbane before they are sent out to country areas.

The routine examinations are conducted by the nurses of the Division, and since the beginning of 1955 an endeavour has been made to visit each school once a year. Certain grades of children are examined in such a way that each child is seen every two years. The annual visit to the school is described as being a help to teachers, who have an opportunity to discuss special problems with which they have to deal. The school nurses are often called upon to investigate minor skin infections, pediculosis infestations and children with special problems such as backwardness. During the year, 86,818 children were examined. Of these 26,380 were in Brisbane and 60,438 in country schools. School medical officers examined 13,426 of these children, and a number of them were newly admitted children and those referred from upper grades. The number of schools visited in the routine medical examinations was 1048, including 106 Brisbane schools and 942 situated in the country. Of the children examined, 3838 were considered to have medical defects requiring further opinions. This figure includes only those children whose parents were notified in writing of the defect found. It does not include those children with defects which were already receiving attention, or those with defects which it was thought could not be relieved by further medical advice. The follow-up of children with notified defects is carried out by school nurses and head teachers.

In regard to communicable diseases in schools, it is noted that only 26 cases of diphtheria occurred in school children during the year. This is the lowest number recorded during post-war years. It was found that the percentage of children commencing school who had received initial immunization against diphtheria was 91.2 in Brisbane schools and 87 in country schools. The figures for children who had in addition received booster doses was only 39.85% in Brisbane and 18.3% in country schools. There was an increase in the total number of cases of poliomyelitis. During the year 101 cases were reported as having occurred among school children; the figures for the previous two years were 23 and 95 respectively. We read that the incidence was not as high as during the major epidemic years of 1950-1951 and 1951-1952; this is perhaps cold comfort. Six cases of tetanus occurred during the year in school children. The percentage of children receiving protection by immunization against tetanus is regarded as too small to be responsible for the low incidence of the disease. Only 38.28% of children entering school had been immunized against tetanus. The view is expressed that the use of triple antigen recently introduced for initial immunization and the wider use of the single antigen tetanus toxoid for older children will no doubt increase this percentage as the years go by. Of other communicable diseases, it is noted that 115 children were notified as suffering from rheumatic fever; the rate was higher in Brisbane than in the country. Nine children were reported as suffering from cerebro-spinal meningitis, two as suffering from typhoid fever, ten from lead poisoning and 13 from tuberculosis.

Mantoux testing in primary schools in Brisbane was carried out by officers from the Chest Clinic. The children submitted to the test included all who intended to leave the primary school during the current year. The number of children tested was 4889. Of these 1263 children gave positive reactions—a percentage of 25.8. In one school the percentage of positive reactions was 59; this was the subject of a special investigation. Approval has been given for a scheme by which the teachers will have an annual X-ray examination of their lungs on a voluntary basis.

Opportunity classes are held for educationally subnormal children and the number of these is growing.

In regard to health education in schools, the view is expressed that actual instruction is best given by the class teacher, who is always present and is far better qualified to teach the children than medical or nursing personnel, whose visits are too infrequent.

An annual camp is held by the Physical Education Branch of the National Fitness Camp at Tallebudgera for student teachers. The camp is supervised by the chief medical

officer, and school health topics are discussed by the students. Student teachers are medically examined before admission to the training college. These examinations are used not only to enable a decision to be reached about medical fitness of the candidates entering the department, but also as an opportunity to give advice on many personal health problems.

Local medical officers are still employed in western Queensland in a part-time capacity to treat eye diseases such as trachoma, which may occur in school children in their towns. Reports show that trachoma, which was once a very severe disease, is now mild and low in incidence.

Some information is given about the school dental services, but these need not be discussed at present.

The general conclusion to be gained from the perusal of this part of the Director-General's report is that medical inspection of schools in Queensland is regarded seriously. At the same time, it would seem that the Director-General is being asked to do the work with an insufficient medical staff. Nursing sisters can be trained as reliable observers, but as they have not had medical training, they will not always be able to pick out children who should receive attention. There is no doubt that the Director-General would receive the wholehearted support of the medical profession if he were to ask for more school medical officers.

had beds. Then he went to study abroad; he went to do ear, nose and throat work, but settled on diseases of the eye. In this specialty he was successful, especially surgically. He was a philosopher, widely read with a deep understanding and love of music, especially Bach. He read Boswell and Pepys when only 12% of his fellow students had even heard of them; now, of course, racing reporters copy the style. He retained his interest in books and music until a few weeks before his death, and one felt that when he could no longer enjoy these, it was better that he should pass on. Those who understood him, and they were not many, will miss him.

Dr. C. J. R. CARDAMATIS writes: I met George about thirty years ago. Instead of our interview lasting ten minutes we found out that we were old friends in individual interests, and we chatted for a whole hour. I know then that George was a lonely man, one of the few in the *Via Dolorosa* (my new name for Macquarie Street). The amazing part about Dr. Brookes was his high intelligence; hence his cold realism towards the essentials of life. He taught me a lot about my approach towards my new surroundings. I distinctly remember when he said to me: "They will take you to their hearts if you deserve it, but no further." Then his chief distinction was that he was not a *bourgeois gentilhomme*, he was a real brain aristocrat.

Obituary.

GEORGE ARTHUR BROOKES.

Dr. C. F. ROBINSON writes: George Brookes is dead. He accomplished what he set out to do, first as a civil servant, then through medicine by his own efforts. He was a successful general practitioner, who hit all round the wicket, and an excellent general surgeon on the staff of near-by Lewisham Hospital, yet he was always alive to cultural interests. He had Hilder's pictures in his home before he

University Intelligence.

THE UNIVERSITY OF SYDNEY.

The Senate of the University of Sydney has appointed Dr. Charles Ruthven Bickerton Blackburn to the Chair of Medicine in succession to Professor Charles George Lambie, who is retiring. Dr. Ruthven Blackburn is an Australian and a graduate in medicine of the University of Sydney. He is at present Director of the Clinical Research Unit of the Royal Prince Alfred Hospital, Sydney.

DISEASES NOTIFIED IN EACH STATE AND TERRITORY OF AUSTRALIA FOR THE WEEK ENDED JANUARY 28, 1956.¹

Disease.	New South Wales.	Victoria.	Queensland.	South Australia.	Western Australia.	Tasmania.	Northern Territory.	Australian Capital Territory.	Australia.
Acute Rheumatism	7(3)	2	6(3)	1(1)	..	..	..	..	16
Amoebiasis	6(2)	..	..	..	6
Ancylostomiasis	1(1)	3(2)	..	..	..	..	..	4
Anthrax
Bilharziasis
Brucellosis
Cholera
Chorea (St. Vitus)
Dengue
Diarrhoea (Infantile)	11(7)	14(2)	1(1)	..	1(1)	..	..	..	27
Diphtheria	1	2(2)	..	..	7(6)	..	..	..	10
Dysentery (Bacillary)	13(13)	..	..	..	..	..	13
Encephalitis	1	..	1	..	..	..	..	2
Epilepsy
Homologous Serum Jaundice
Hydatid	1	..	..	..	..	..	..	1
Infective Hepatitis	122(72)	58(34)	..	15(3)	8(5)	..	2	1	206
Lead Poisoning	1	..	..	..	..	..	1
Leprosy
Leptospirosis
Malaria	1(1)	..	..	..	..	..	1
Meningococcal Infection	1(1)	1	2	..	4
Ophthalmia	1	..	..	..	1
Ornithosis
Paratyphoid
Plague
Poliomyelitis	5(1)	3(2)	6(5)	6(2)	75(48)	..	..	3	98
Puerperal Fever
Rubella	51(38)	..	6(4)	1(1)	..	..	..	58
Salmonella Infection	5(5)	..	..	..	5
Scarlet Fever	5(2)	3(2)	2(1)	1	3(2)	..	..	1	15
Smallpox
Tetanus	2(1)	..	..	..	..	..	2
Trachoma	1(1)	..	..	..	1
Trichinosis
Tuberculosis	34(21)	12(7)	18(15)	8(7)	11(9)	7(2)	..	..	90
Typhoid Fever	2(1)	..	..	..	..	..	..	2
Typhus (Flea, Mite and Tick-borne)	1(1)	..	1	..	1(1)	..	..	..	3
Typhus (Louse-borne)
Yellow Fever

¹ Figures in parentheses are those for the metropolitan area.

Notice.

THE LATE DR. KENNETH G. CHATFIELD.

A TRUST FUND has been established to provide for the education of the children of the late Dr. Kenneth Chatfield, who was killed in a motor-car accident on December 29, 1955. Any of his friends wishing to contribute should send cheques *et cetera* to Dr. A. T. Taylor, Mornington, Victoria.

Nominations and Elections.

THE undermentioned have applied for election as members of the New South Wales Branch of the British Medical Association:

- Harvey, Patrick Watson, M.B., B.S., 1954 (Univ. Sydney), Sydney Hospital, Sydney.
 Macarthur, Edward Barrie, M.B., B.S., 1952 (Univ. Sydney), c.o. St. Luke's Hospital, Kansas City 11, Missouri, United States of America.
 Collins, Frederick John, M.B., B.S., 1955 (Univ. Sydney), 4 Princes Promenade, Seaforth, New South Wales.
 Oeding, Francis Joseph, M.B., B.S., 1954 (Univ. Sydney), 68 Alt Street, Ashfield, New South Wales.

The undermentioned have applied for election as members of the South Australian Branch of the British Medical Association:

- Southgate, Deane Oakford, qualified 1954, 101 Cambridge Terrace, Malvern, South Australia.
 Smlbert, George James, qualified 1954, 23 Bruce Street, Wallaroo, South Australia.
 Lykke, Athol William John, qualified 1955, 6 Ayr Avenue, Torrens Park, South Australia.
 Pirotta, Thomas, qualified 1955, Royal Adelaide Hospital, Adelaide.
 Beer, Barbara Helen, qualified 1955, 3 Charlbury Road, Medindie Gardens, South Australia.

The undermentioned have been elected as members of the South Australian Branch of the British Medical Association: Steven, Ian Matheson, qualified 1955; Coulter, John Richard, qualified 1955; Ballal, Nandor, qualified 1955; Barton, David Charles, qualified 1955; Rieger, Richard Anthony, qualified 1955; Adams, Graeme Sorby, qualified 1955; Bennett, William Barkley, qualified 1955; Collins, Allen Geoffrey, qualified 1955; Grivell, Peter Desmond, qualified 1955; Grote, Fay, qualified 1955; Hamilton, Ian Michael, qualified 1955; Higgins, Bruce Ashley, qualified 1955; Hobbs, Brian Kenneth, qualified 1955; Kaupmees, Lennart, qualified 1955; Lee, Chye Chow, qualified 1955; Leitch, Raymond John, qualified 1955; McCoy, William Taylor, qualified 1955; Patching, Desmond William, qualified 1955; Reid, Donald Peter, qualified 1955; Sandison, Alexander Geoffrey, qualified 1955; Southwood, Richard Taunton, qualified 1955; Stern, Leon Max, qualified 1955; Townsend, Douglas George, qualified 1955; Townsend, Norman Charles Wilson, qualified 1955; Walters, William Allen Wilcox, qualified 1955; Wilson, Laurence Leigh, qualified 1955; Brown, Margaret, qualified 1955; Maguire, Maurice Glen, qualified 1952; Nairn, Donald Elwyn, qualified 1952; Wyllie, Robert Gurner, qualified 1954.

Deaths.

THE following deaths have been announced:

- BLAUBAUM.—Athol Blaubaum, on January 31, 1956, at Melbourne.
 GROSSLICHT.—Robert Grosslicht, on February 6, 1956, at Randwick, New South Wales.
 BARTON.—Oswald Barton, on February 6, 1956, at Scone, New South Wales.
 WALTON.—William Basil Walton, on February 8, 1956, at Bellevue Hill, Sydney.
 TAYLOR.—Hugh Morris Taylor, on February 11, 1956, at Clifton Gardens, Sydney.

Medical Appointments.

Dr. H. M. Bower has been appointed Superintendent of the Mental Hospital, Kew, Victoria, pursuant to the provisions of Section 35 of the *Mental Hygiene Act, 1928*, of Victoria.

Diary for the Month.

- FEB. 21.—New South Wales Branch, B.M.A.: Medical Politics Committee.
 FEB. 22.—Victorian Branch, B.M.A.: Branch Council.
 FEB. 23.—South Australian Branch, B.M.A.: Scientific Meeting.
 FEB. 24.—Queensland Branch, B.M.A.: Council Meeting.
 FEB. 25.—Tasmanian Branch, B.M.A.: Annual Meeting.
 FEB. 27.—Federal Council, B.M.A. in Australia: Meeting at Hobart.
 FEB. 28.—New South Wales Branch, B.M.A.: Ethics Committee.

Medical Appointments: Important Notice.

MEDICAL PRACTITIONERS are requested not to apply for any appointment mentioned below without having first communicated with the Honorary Secretary of the Branch concerned, or with the Medical Secretary of the British Medical Association, Tavistock Square, London, W.C.1.

New South Wales Branch (Medical Secretary, 135 Macquarie Street, Sydney): All contract practice appointments in New South Wales.

Queensland Branch (Honorary Secretary, B.M.A. House, 225 Wickham Terrace, Brisbane, B17): Bundaberg Medical Institute. Members accepting LODGE appointments and those desiring to accept appointments to any COUNTRY HOSPITAL or position outside Australia are advised, in their own interests, to submit a copy of their Agreement to the Council before signing.

South Australian Branch (Honorary Secretary, 80 Brougham Place, North Adelaide): All contract practice appointments in South Australia.

Western Australian Branch (Honorary Secretary, 8 King's Park, West Perth): Norseman Hospital; all contract practice appointments in Western Australia. All government appointments with the exception of those of the Department of Public Health.

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